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ABSTRACT

Evaluated with 30 trainees (age 12 - adult) was the Stereotoner (a chest-worn, ink print reading aid for the blind) in order to develop specialized instructional materials; coordinate a program of instruction; evaluate candidates, processes, and outcomes of training; and make available the basic course materials developed during the study. The output of the Stereotoner consists of ten separate tones activated according to the shape of the individual letters or numbers being sensed through a small, moving camera or probe. Ss found the auditory code difficult to learn and their ability to read various difficult formats to be limited. Following 54 hours of formal training average reading rates were four words-per-minute (WPM) with an average of 80% accuracy on isolated words; and with the addition of an 87-hour home study period, average reading rates increased to 7WPM but accuracy decreased to 66%. Results indicated that some blind persons can learn to read ink print materials with the Stereotoner; however, careful screening and selection for auditory discrimination ability and personal motivation is necessary. Products resulting from the project included a taped auditory selection test, a series of pre-training orientation tapes, a basic instructional manual, and a home study manual with tapes. (Results are tabulated and seven case studies are presented in detail. Approximately half of the document consists of such appended items as excerpts from the instructional manual and home study manual, criterion tests, and additional case studies.) (IM)

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Evaluation of an Ink Print Reading Aid for the Blind: The Stereotoner

Contract No. V101(134)P-163

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FINAL REPORT

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ABSTRACT

Background of Problem and Objectives of Project

The Veterans Administration has provided support for the development of new prosthetic aids for handicapped persons for many years. The Stereotoner is a chest worn, ink print reading aid for the blind developed by Mauch Laboratories under VA contract, and is an outgrowth of earlier exploratory research with direct optical to auditory conversion devices. The Stereotoner output, consisting of 10 separate tones, is activated according to the shape of the individual letters or numbers being sensed through a small, moving camera or probe.

The present study was designed to:

- develop specialized instructional materials for the Stereotoner
- coordinate a program of instruction carried out by three VA and two non-veteran instructors.
- evaluate a) candidates for training, b) the process of training, and c) the outcomes of training in terms of attained reading performance (reading rate, accuracy, and variety).
- make available multiple copies of basic course materials developed during the study.

Planning and Design of Project

The main study plan called for the provision of some 48 adult trainees from veteran and non-veteran referral services and for their instruction at three VA Blind Rehabilitation Centers (in Connecticut, Illinois and California) and the Hadley School for the Blind, in Illinois. Additional exploratory instruction took place with a youngster in a public school in California.

Instructional materials were adapted from a prior AIR study in ink print reading for the blind and were substantially augmented by additional tapes and manuals. A new instrument (the Auditory Selection Test) was developed to specifically assess aptitude for Stereotoner training. Additional instruments were also developed to investigate the relationship of background and process variables to attained reading performance. Observational and interview data were collected throughout instruction, one month after training, and at least four months after training. Criterion tests were administered at the end of formal training (2-4 weeks) and again at the time of a final follow-up visit in the trainee's home or office.

Analyses of Results

Fifty trainees were admitted to training. The main study analyses were based on 30 trainees who completed at least the first criterion test; 17 persons dropped out for a variety of reasons, and 3 persons were classified as special cases and their performance was analyzed separately.

Results indicated that following formal training, covering about 54 hours of instruction, trainees' average reading rates were 4 WPM and they averaged 80% accuracy on isolated words. Following a period of home study covering about 87 hours, trainees' average reading rates increased to 7 WPM but accuracy decreased to 66%. Respectively, 13 WPM and 34 WPM represented the uppermost speeds attained in Criterion Tests A and B by the participants. However, one person not in the sample group was observed reading at 85 to 90 WPM with the Stereotoner. His technique was analyzed and translated into a strategy for more effective instruction in the future. It was also demonstrated in an exploratory effort that a twelve year old blind boy could learn to read with the Stereotoner.

Trainees found the auditory code difficult but possible to learn. They found the precise requirements of line tracking to be the most frustrating aspect of Stereotoner usage. They generally expressed pride in their modest new ability to independently perform personalized tasks such as reading of incoming mail and proofing of typing. However, their ability to read various difficult formats, typefaces, and applied numerals (prices, etc.) was quite limited.

The Auditory Selection Test used as a prediction measure was found to be significantly and positively correlated with Stereotoner reading performance. A revised and shortened form was produced for subsequent use by the training agencies including the VA. Age proved to be the most highly correlated background variable, with younger trainees doing better.

Both the instructional materials and the instructors' methods were favorably described by the trainees. It was established that instructors should place more emphasis on whole word sound patterns and context recognition in future training efforts. Trainees felt that home study is difficult without the availability of direct, periodic instructor intervention, leading to a possible loss of momentum. Even so, ample home study time was crucial.

Interpretation and Implications

It is clear that some blind persons, but by no means all, can learn to read ink print materials with the Stereotoner. Consequently, it can be added to the repertoire of devices and aids currently available at blind rehabilitation centers. Careful screening and selection procedures should be employed to avoid excessive frustration and failure. These procedures should include the newly developed Auditory Selection Test and a consideration of personal factors and individual commitment.

It is also clear that reading rates and accuracy are typically modest at the outset. Concerted and prolonged study is required of trainees if they are to achieve real proficiency. Personal priorities sometimes mitigate against such a level of commitment and trainees should be realistically informed about this prior to training.

It was recommended that Stereotoner training programs continue, that recently developed adjunct aids (an automatic pacer and a tracking aid for books) be made available to trainees, and that the revised AIR instructional materials be utilized. It was further recommended that the training be dispersed more widely throughout the country to facilitate trainees' access to the centers, and that sessions be better spaced so as to avoid trainee fatigue.

Given the difficulties encountered and slow rates attained, it was recommended that further research and development be conducted with ink print reading devices having spelled speech output or synthetic speech output. Hopefully, such efforts would lead to a simpler, more rapidly learned and more widely used aid for blind persons, whose independent access to printed material is important to their personal and economic well being.

Project Products

In addition to the Final Report, the project resulted in the preparation of multiple copies of: a) a taped Auditory Selection Test, with examiner's manual and score sheets, b) a series of pre-training orientation tapes, c) a basic Instructional Manual, with accompanying drill and practice tape and complete instructor's guide, d) a Home Study Manual containing 48 lessons, with five accompanying instructional tapes.

ACKNOWLEDGMENTS

This project was truly a joint effort. Staff at the three Veterans Administration Hospitals at Palo Alto, California; Hines, Illinois; and West Haven, Connecticut, were generous with their time and counsel. Appreciation is especially due to Mr. Harvey Lauer, Mr. Richard Bennett, and Mr. Chester Lewis, who served as instructors, collected data on their students' progress, and were directly involved in the development of specialized instructional materials and tapes.

Miss Margaret Butow, of the Hadley School for the Blind in Winnetka, Illinois, deserves special thanks as well. She expertly filled the roles of instructor, data collector, and advisor on materials development. In addition, she took major responsibility for locating and testing the non-veterans involved in the study.

The public school instructor in Northern California, who was himself a Stereotoner trainee, then taught one of his students, was inventive, resourceful and patient. We think of him as a friend, just as we do Peggy, Harvey, Richard and Chester.

A diverse team worked on this project within AIR. Assessment instruments were devised with the help of Dr. Malcolm Danoff. Instructional materials were developed with the help of Ms. Barbara Rodabaugh, Ms. Catherine Taylor, Ms. Claudette Smith, and Dr. Gary Coles. Dr. Danoff and Ms. Smith also were involved in field data collection. Data Analysis was the province of Dr. Bruce Everett. Technical counsel was always available from Dr. Albert Chalupsky. The secretarial and administrative aspects of the project, which were critical to its accomplishment, were shared by Ms. Pat Johnson and Ms. Carrie Davis. All of these staff performed ably and I thank them for their efforts and insights.

R.A.W.

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I. INTRODUCTION

Background

Blind persons are confronted daily with an abundance of printed material which they cannot utilize in any immediate sense. They have the alternative of asking for some materials to be brailled, if they can wait that long and are familiar with braille; they can ask for materials to be taped or read aloud, if they can make the necessary arrangements and are willing to forego privacy in communications; or they can focus their attention upon materials that have already been transposed (into Talking Books and other media) at a national or regional level. Certainly none of these options is without drawbacks, both in terms of practical turn-around time and in terms of the forced dependence on others to receive and process information, whether personal, social, business, or leisure affairs.

While many engineers, scientists and educators have shared the hope that technology could be usefully brought to bear on this problem, there is considerable disagreement as to how this can best be done, what the present state of the art will permit, and what human factors should be taken into account when designing and developing reading devices for the blind.

The history of the development of ink print reading aids for the totally blind can be traced back to 1912, when Dr. E. E. Fournier d'Albe, constructed a crude device to demonstrate the principles of a reading machine. Later, the British firm of Barr and Stroud constructed additional devices to convert letter shapes into tone patterns. Thus, the British "optophone," as such devices came to be known, was a percursor to a number of other direct conversion devices, with the majority of these occuring in the United States since WWII. (Freiberger, 1972)

Murphy (1972) summarized some of this work in the postwar era, indicating that the RCA Reading Aid (the A-2 "reading pencil") was reportedly used by some subjects to peak speeds of 56 WPM, a truly remarkable figure by any standards.

Then, in the late 1950's, another reading device study was undertaken by the Battelle Memorial Institute. After several models of the Battelle optophone had been developed and an extensive series of lessons (some 200) had been prepared, a third party evaluation study was attempted, but never completed. In one sense, however, the Battelle work was a pioneering effort, hampered though it was by cumbersome equipment and by a small sample, comprised of school children with a few adults. The Battelle staff were able to establish the "recognizability" of particular letters and relate those letters to each other in terms of their similarity in shape and sound. (Abma, Hoffman, Mason, and Coffey, 1960). Slow reading rates, then, were seen as being a function of frequently "confused" letters (letters that sound similar) appearing in words. Furthermore, this confusion was critical when the words were presented in isolation of contextual meaning. Finally, some of the Battelle findings were quite puzzling and seemingly contradictory, such as contradictory correlations between intelligence and final performance for two student groups. (Coffey, Hull, Metcalfe, and Mason, 1961).

It should be noted that the RCA approach and the Battelle approach were not the only ones concerned with direct conversion of print. Other efforts have been made by the Canadians (the Lexiphone) and the Russians (an optophone). Of particular relevance to this report, the lineage of audible output devices (the Visotoner and the Stereotoner) had been added to by Mauch Laboratories. (Smith and Mauch, 1975)

It should be pointed out that a somewhat parallel evolutionary trend existed with respect to devices that convert ink print to tactile outputs. The Optacon, a device produced by Telesensory Systems Inc., is by far the most widely known and used. (Linvill, 1973). Current efforts in that line of development are being directed toward making the Optacon more compact, and one-handed rather than two-handed. The American Institutes for Research (AIR) carried out a comprehensive national evaluation of the Optacon with blind elementary and secondary students in some 15 school districts under contract from the U.S. Office of Education (Weisgerber, Everett, Rodabaugh, Shanner, Crawford, 1974)

Various universities and firms (including Mauch Laboratories), are already at work on the potential ink print converters of the future. These hold the promise of converting inkprint images into more readily recognizable audible output, either spelled speech or synthesized words. The compelling argument for machines of this type is that they should dramatically increase reading rates while decreasing the training time required by the typical blind person. Their most apparent drawbacks at this time are their likely cost, the uncertainty surrounding their general availability, their versatility and their portability (computer technology is involved).

The Veterans Administration, which has directly or indirectly supported many of these engineering advances, also has recognized the importance of a neutral, third party appraisal of such devices in terms of the extent to which they might enhance the living skills of blind veterans and the larger non-veteran community as well. In supporting the training and evaluation study reported here they have repeatedly made it clear that they do not "favor" any device but rather want to be confident that their constituency of blind veterans is given the fullest access to any and all ink print reading devices which have demonstrable value. This evaluation cannot be established in engineering laboratories but must be done in "the real world". Thus, the VA concerns are: that the strengths and limitations of various devices become better known; that meaningful choices be made available to veterans not only in terms of personal preference but also in terms of probable proficiency; and that appropriate, educationally sound training be designed with the specific needs of their adult veteran population (which has been estimated at 4,000 totally blind) in mind.

Objectives of the AIR Study

The American Institutes for Research undertook an impartial evaluation of the Stereotoner* on behalf of the Veterans Administration and the

---

*The Stereotoner is manufactured and sold by Mauch Laboratories Inc., 3035 Dryden Road, Dayton, Ohio 45439

National Research Council. This study was initiated in July 1972, and was carried out with the cooperation of three Veterans Administration Blind Rehabilitation Centers (Hines, Illinois; Palo Alto, California; and West Haven, Connecticut) and, in non-veteran settings, the Hadley School for the Blind, Illinois, and a public school in Northern California.

The principal objectives of the study were:

- To develop special instructional units which, when integrated with existing training materials developed by AIR, would give blinded adult trainees a relatively rapid and rewarding mastery of character and word recognition skills with the Stereotoner in a tutorial training context.
- To design and develop a series of home study exercises which would supplement and build upon the preceding tutorial training.
- To provide multiple copies of all newly developed Stereotoner training materials to the Veterans Administration for use by its own training staff.
- To provide four instructors designated by the Veterans Administration with orientation and training in the use of these materials.
- To provide such counsel as necessary during the VA instructors' first use of the training materials with blind trainees.
- To develop an evaluation plan which would assess interim trainee performance and post-course performance and relate these to trainee selection procedures utilized by the Veterans Administration.

- To implement the evaluation plan for approximately 48 trainees (as might be identified by the Veterans Administration and/or Hadley School), with performance data to be collected in part by VA personnel and in part by AIR personnel.
- To develop interview schedules and undertake telephone interviews following formal training, as well as make home visits and conduct personal interviews with about half of the trainees.
- To analyze and interpret these data in terms which make clear the "typical" attained reading speeds and accuracy, as well as actual uses that can be expected with the Stereotoner, and to display these findings in a manner which takes into account trainee characteristics and can be used for predictive purposes.

Brief Description of the Stereotoner

As can be seen in Figure 1, the Stereotoner is a battery operated, portable device, weighing some 1½ pounds, designed to be worn on the user's chest, suspended by a neck strap. As the name implies, it delivers a stereophonic effect through two earpieces, though a monaural switch makes that feature optional. Balancing of the sound levels in each ear is accomplished through two separate volume controls. The sounds produced are all derived from 10 tones (Hertz: 440, 554, 698, 880, 1108, 1396, 1760, 2216, 2792, 3520). These tones are produced singly or in combination, depending upon the nature of the ink print being detected. Jacks on both sides of the Stereotoner housing enable an instructor to listen in while the trainee is tracking.

This sensing is accomplished by a small, permanently attached camera or probe, containing a "column" of ten sensors which act through a slit on the bottom of the camera. The sensors are activated by reflected light (or dark), depending on whether the Stereotoner has been set by the operator for black print on white paper or white print on black paper. Thus, in normal usage, as the camera traverses a capital E from the left to right, it is likely that as many as nine tones will be activated for a brief moment, but only three of those tones will continue to sound as the camera continues to move to the right.

The camera has adjustments allowing 10:1 magnification range to a maximum 3/4 inch, and has adjustments for brightness of the lamp to compensate for varying reflective paper qualities and for magnification changes. Further, the roller on the underside of the camera can be set straight or offset, depending on whether the typeface is vertical or italicized, since it is evident that an "I" or an "*I*" would otherwise be detected quite differently by the row of sensors.

A small, ruler-like tracking aid, detachable from the Stereotoner, is used to guide the camera along the lines of type. Since it contains a roller of its own, it also assists in the downward movement from line to line.

The Mauch Laboratories have developed several ancillary devices, including a Reflex Viewer (see Figure 2) which is meant to assist sighted instructors in observing each letter being "detected" by the Stereotoner. Recently, and not available for use in this study, they have developed an automatic pacing device which physically moves the camera at preset rates to assist in building reading speed, as well as an adjustable magnetic tracking aid designed to accommodate the reading of print materials that come in bound text rather than sheet form.

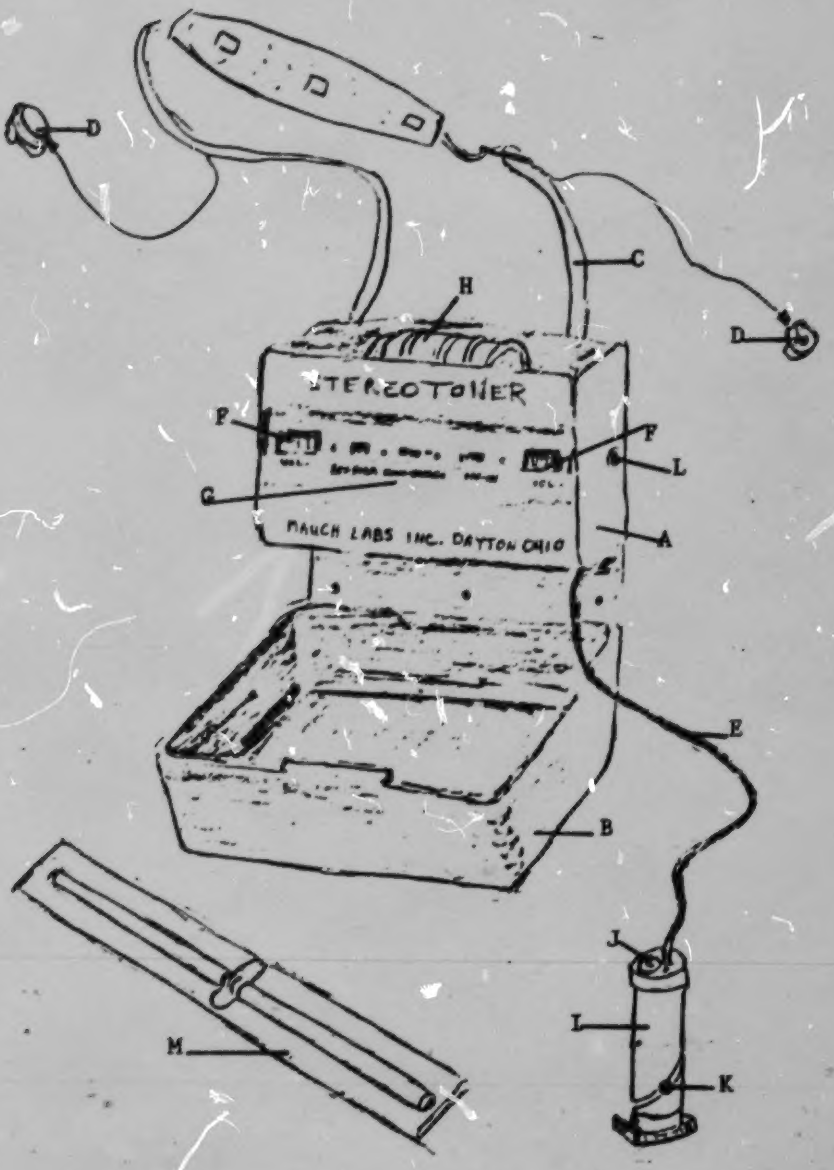
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Figure 1. Sketch of the Stereotoner showing principal parts.

A. Electronic compartment
B. Cover
C. Neck strap
D. Ear plugs
E. Cable
F. Volume controls
G. Controls
(On-Off, Stereo-Mono,
Reverse-Normal)

H. Battery
I. Camera or Light probe
J. Lamp adjustment control
K. Magnification control
L. Jack for instructor earphone
M. Tracking aid

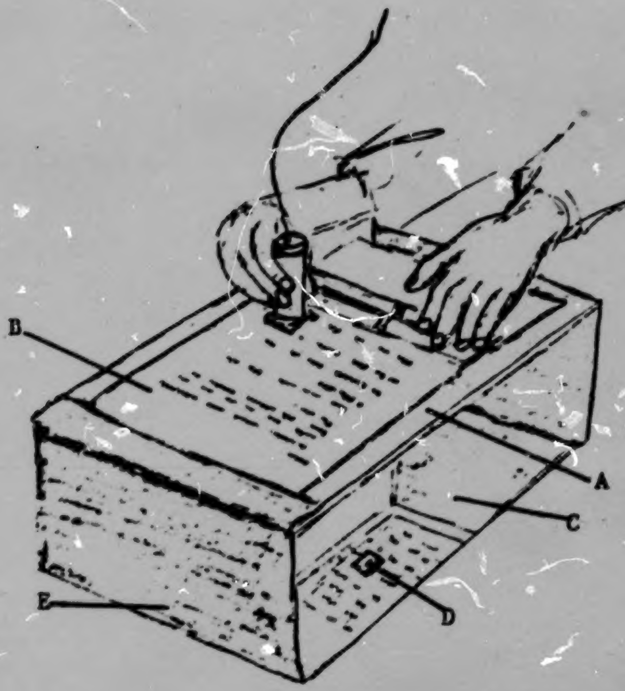

Figure 2. Reflex Viewer, used with sighted instructor .

A. Transparent plate
B. Standard typewritten letter
C. Mirrored surface
D. Illuminated print character
E. Metal frame

II. METHODS

Instructional Materials Development

Due to its earlier work for the U.S. Office of Education, involving the educational evaluation of the Optacon, AIR had already designed and developed a comprehensive training manual for the learning of ink print reading via a conversion device. Utilizing a similar instructional strategy, and drawing heavily from the prior manual, AIR staff met with instructors from each of the three VA Blind Rehabilitation Centers and from the Hadley School for the Blind to design a new basic instructional manual. It was intended to be a) appropriate to the interests of the adults being served, and b) accomodating of the particular design characteristics of the device itself. Throughout the project a number of additional support materials were developed, including study materials for pre-training orientation to the Stereotoner, materials to use in the absence of an instructor, and a special manual for follow-up study in the home.

The complete, revised instructional package involved the following components:

- A set of Pre-training Tapes which the candidate for training may listen to before initiating his formal training. These cassette tapes describe the Stereotoner, illustrate the sounds produced by various letters and numbers, and provide an opportunity to develop listening discrimination skills as well as some familiarity with the tonal code.
- An Instructional Manual which contains a variety of student reading material, instructor's guidelines, criterion exercises, and remedial exercises. (see Appendix A-1)

The Instructional Manual is contained in a three-ring binder, allowing ready use of individual sheets, and comprises some 14 units. As revised, Unit 1 is concerned with discrimination skills, Units 2 through 8 deal with the alphabet (presented as discrete letters, as words, and as meaningful sentences), Unit 9 is designed to build reading speed, Unit 10 deals with numerals and mathematical applications, Unit 11 through 13 deal with special problems of type face, format, field usage, etc., and Unit 14 is for remediation in the event that a trainee has persistent problems with particular characters. It should be noted that each unit of instruction is followed by criterion exercises to establish the individual's mastery of the unit and his readiness to move into new study material. Accompanying the manual is a Drill and Practice Tape, containing the alphabet, numerals, common words, and selected sentences, which can be used by the trainee as a supplement to his tutorial instruction.

- A Home Study Manual which is to be used only after the trainee has developed basic reading skills. It consists of some 48 lessons distributed evenly in four units: Personal Affairs, Leisure Affairs, Social Affairs, and Business Affairs. (see Appendix A-2)

Five cassette tapes accompany the Manual. The first is to explain procedures to the trainee and to set up a study program in which he or she practices reading in narrative materials of his or her own choice. The other four tapes "talk him through" the specific lesson materials in the Manual. It should be noted that criterion exercises are included for each unit solely for self evaluation purposes, since the intent of the Manual is not to teach total mastery but rather to provide the trainee with a wide ranging and "protected" introduction to the enormous variations that exist in the world of print. In other words, the Home Study Manual is designed to help the trainee discover what applications of ink print reading seem feasible for him or her.

Throughout the preparation of tapes and manuals the Veterans Administration and Hadley School instructors were directly involved and most helpful.

Instructional Plan

The strategy for instruction was largely a function of adapting to existing Veterans Administration training procedures. That is, potential trainees were identified by field personnel, tested for auditory aptitude with a specially developed Auditory Selection Test and brought to the Rehabilitation Center for (typically) from 2 to 3 weeks of concentrated training. A similar procedure was followed by the Hadley School for the Blind. Typically, training with an instructor took place for around 4 hours per day. Some of this potential training time was taken up by other activities (at the VA Centers this included testing unrelated to the research project), but to some extent training time was added for those trainees who chose to study in the evenings on their own.

Individual differences among the trainees led to considerable variation in the total amount of study time devoted prior to departure from the Training Centers, as well as in the amount of material covered. In that regard, this was a realistic reflection of the fact that a) trainees differed in their ability to learn the tonal code, and b) as adults, many could only leave their homes and jobs for limited periods.

Training at the public school in Northern California was quite different in approach inasmuch as it was an exploratory instructional effort with a blind teacher and blind student involving short study periods spaced over several semesters. The blind instructor there was taught via the basic Instructional Manual, by a sighted instructor and considerable self practice. In the case of the student, specially developed instructional materials were used. These special cases are described more fully elsewhere in this report.

All instruction at the VA Centers and at Hadley was on a one-to-one basis. It was carried out by blind instructors, who listened through earpieces plugged into the students' Stereotoners, and who tutored them accordingly. Much attention was given to machine operation and particularly to the techniques of tracking inasmuch as this is one of the crucial skills to be learned, and is essential for proper learning of the tonal code.

After the trainees left the centers and began home study they were encouraged to communicate with their instructors regarding problems or questions and, at the end of each unit, to send in self-generated cassette tapes for instructor review of their Stereotoner reading performance. These tapes were not an important source of evaluative data, but rather were a vehicle for instructional suggestions to improve performance.

Plan for Data Collection

A variety of data were collected in this study, including background data, performance data, interview data, and observational data. In the interests of clarity, the measures and types of data will be discussed in the approximate sequence in which they were used.

- Auditory Selection Test (AST) - This taped test was devised as a preliminary indicator of a person's ability to hear the Stereotoner code in a functional manner. Specifically, individuals were tested to see if they could differentiate various letter combinations on the basis of a) tone shift and placement, b) the counting of characters comprising a simulated word, and c) "word" patterning. This test went through several stages of pilot testing and revisions before being used within the study, and has been revised and shortened, based on the information gained in the study. The data reported here are based on the short form of that test, since that is the version most likely to be used in the future.*

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*It is likely that the taped test and accompanying Examiner's Manual will be available for loan through the Hadley School for the Blind, Winnetka, Illinois.

A guideline for acceptance into training was set, based on whether a candidate achieved a score of 70% or better on the AST. This was decided on as a compromise level to ensure, on the one hand, that a range of trainee abilities would be represented in the study and, on the other hand, that no candidate with an obvious likelihood of failing would be asked to make the personal commitment necessary for participation. As will be indicated in the findings section, the acceptance level for further training should probably be set somewhat higher.

- Trainee descriptive instruments - At the outset of training, and not intended as a selection factor, several kinds of information were obtained about each trainee. These included:
  a) Background information related to age, sex, marital status, blindness condition and occurrence of blindness, musical skills, familiarity with audible codes, occupational status, and educational level.
  b) Intellectual functioning as indicated by the verbal portion of the Wechsler Adult Intelligence Scale (WAIS).
  c) Hearing ability as indicated by audiometric measures, extrapolated to the Stereotoner frequencies.
  d) Reading preference as indicated by a three-part check sheet of personal priorities.
  e) A measure of tracking ability based on the ability of the trainee to move the camera at a reasonable rate without veering upward or downward.

- Indicators of student progress - During formal training these indicators included:
  a) Anecdotal notes on progress and problems as recorded by instructors.

b) Scores on criterion exercises at the end of particular alphabet and numeral study units.

c) Logs of study time by unit and by day.

Following formal training these indicators included:

d) A follow-up telephone interview by AIR approximately one month after training.

e) Post cards sent periodically to AIR by trainees, describing their study time and materials used.

f) A follow-up interview by AIR in the home or office of trainees.

- Criterion Tests of Performance - Assessments of trainees' developed reading skills (see Appendix E for Criterion Test example) were made at two points in time:

a) Criterion Test A was administered by the instructors at the end of formal training; that is, when the instructor felt that the trainee was ready and/or the trainee had to depart the center. The test consisted of samples of 168 words and numerals in isolation, 20 short sentences, and two paragraphs. In practice, many trainees were unable to complete the whole test and cut off times were established for each part in an attempt to control for fatigue and other spurious factors.

b) Criterion Test B was administered by AIR staff at the time of the follow-up home visit. In most instances, this took place after at least four months had elapsed in order to allow a reasonable time for the trainee to practice reading narrative material at home as well as explore the variety of materials in the 48 lessons in the Home Study Manual. The test itself was directly parallel to Criterion Test A in its composition of words, numerals, sentences, and paragraphs. However, it also included one additional section that was meant to test the individual's flexibility in dealing with various print formats, type styles, numerals in context, etc.

Study Sample

Although some 50 persons were accepted and began training, there was considerable attrition in this number for various reasons, including choice of alternative reading devices, health or personal reasons, and lack of appreciable progress in mastery of the Stereotoner, either in tracking or decoding. For purposes of this evaluation, the trainees have been divided into 30 Main Study Cases, where most data were obtained, 17 Dropout Cases, where Criterion Test A was not obtained, and 3 Special Cases, where data could not reasonably be treated along with the other cases due to important differences in the nature of training or age of the participant.

Of the Main Study Cases, some 10 were veterans and 20 were non-veterans; while of the Dropout Cases, some 14 were veterans and 3 were non-veterans.

It should be noted that some 122 persons were administered the AST but many of these did not elect to enter training (being unwilling to leave their home or job) or were ineligible for other reasons (e.g., sighted, VA staff, etc.)

In the strict sense, the study sample cannot be assumed to be representative of the blind community at large inasmuch as the participants were nearly all adults and were not randomly selected, but rather were volunteers identified through deliberate efforts of the VA and other rehabilitation personnel. Furthermore, at least on the non-veteran side, they tended to be located in the Chicago area or at least in the north central area of the United States, proximate to the Hadley School. (The decision to select non-veterans who lived as close to Hadley as possible was influenced in part by the non-veterans' need to be self supporting during training, with a possibility of commuting, and in part by project travel limitations, which became a consideration because of the requirement for home visits.)

Nevertheless, the study sample is a reasonable one when compared to the limited numbers typically involved in device evaluation efforts reported in the literature, the selectivity of the procedures, and given the constraints of blind subject availability that are normally associated with research for the blind.

Choice of Statistics and Analysis Approach

The choice of statistics and analysis techniques is, and should be, determined by the adequacy of the sample, the quality of the data, and the types of research questions to be answered. Little is to be gained and much can be lost through the use of overly sophisticated statistics and the inclusion of too many variables in the analysis. Thus, priorities were placed by the researchers on which of some 80 potential variables merited statistical treatment, and the decision was reached that correlation coefficients, frequencies, means, and standard deviations would be the principal descriptive statistics used. Stepwise multiple regression techniques were used to establish the relative contribution of selected variables to reading performance with the Stereotoner. In certain aspects of the analysis, graphic displays of individual and group data were utilized in order to make clear the comparison being shown.

Appendix C shows the rules for coding and scoring of variables for analysis. Appendix D shows the marginal distributions on the same variables.

Study Assumptions and Limitations

Several considerations should be kept in mind as the findings of this study are presented and interpreted. They include the following:

- All instructors, whether VA or non-VA, were assumed to be equally competent as teachers. Their own hearing was found to be within acceptable limits for Stereotoner usage, and all could interpret the Stereotoner code at least as rapidly as their trainees. Therefore, no effort was made to compare the instructors in terms of their trainees' performance.

- The overall size of the sample and its composition of volunteers limits the generalizability of the findings. Thus, one cannot infer from this study that young school age children would perform better or worse than the adults involved.
- Results of this study cannot be directly compared to AIR's findings in the Optacon study previously alluded to. Not only were the age groups different, and the training periods and programs different, but different criterion measures were used.
- Variance in study time at each Training Center was uncontrolled, being a function of instructor/trainee decisions as to when he or she should take Criterion Test A; similarly, adequate amounts of study in the Home Study Manual were strongly advised though no direct control could be exercised by AIR on whether such study was, in fact, being carried out as suggested. Further, the amount of intervening time before the administration of Criterion Test B was largely a function of when trainees left the Training Centers and whether they were at home long enough to allow appreciable progress through the four-unit Home Study Manual. Again the project was conceived as an exploration to determine what happens to individual Stereotoner users as a result of realistic, flexible training and self study practices.

III. FINDINGS RELATED TO PERFORMANCE

Although the general notion of "performance" with a reading aid such as the Stereotoner brings to mind "words per minute" as a measure of success, there are several other criteria which are equally deserving of examination. Accuracy on a word-by-word basis or comprehension in the reading of whole passages are important issues, as is the mastery of difficult or unusual print materials. Moreover, the ability of individuals to read with the Stereotoner varies considerably: what may be an "average" level of performance for one person may be beyond the reach of another. In this section, we will discuss the reading performance of participants in the study and how that performance may be related to background and training variables.

What are the performance characteristics of the trainees?

The Stereotoner, like all methods of communication requiring the learning of a new code, takes a considerable amount of training and study time before a reliable evaluation of a person's performance can be made. The starting point for all trainees is zero, and there is no functional growth in reading rate until the trainee is exposed to all of the alphabet and word and sentence usage. Thus, a trainee had to have completed formal training before a criterion test could be given, and several months (at least 3) had to pass before a second criterion test would be expected to show further gains in performance.

As discussed earlier, of the 50 people who participated, 3 had to be considered as special cases and 17 dropped out before the first criterion test could be given to them. The 30 remaining participants all received a criterion test after the completion of their formal training, and 25 of these were also given a second criterion test several months after the first. Table 1 summarizes the performance data for the trainees who took at least one criterion test.

Table 1 shows that the average reading rate of the entire group of trainees was 3.8 WPM at the end of formal training; while the 25 who continued on averaged 4.3 WPM. This may seem to be a rather disappointing start, but it is useful to recall that the entire alphabet was only recently taught (at this point) and most of the trainees had not yet learned many word patterns. In addition, the criterion test presumes a knowledge of spelling and vocabulary. Artificially higher reading rates could be obtained by using more simplified texts, but such texts would have few analogues in the trainee's personal life.*

Table 1 shows an average of 141 hours of study time had been accumulated by the time of the second criterion test. After this much formal study and practice, the trainees were reading at an average rate of 6.9 WPM. Although a considerably longer period was covered in home study (3 to 11 months) as opposed to formal training (2 to 4 weeks), the amount of actual Stereotoner usage did not parallel this (about 54 hours in formal training and about 87 hours in home study).

There is a noticeable difference between the rates at which the trainees read one-line sentences and the rates at which they read paragraph material. The difference was probably a function of the time lost in moving the Stereotoner from the end of one line to the beginning of another. Also, the task of retaining and comprehending considerably more material required an additional mental effort, although as overall reading speed increased this apparently became less of a problem.

Numbers are generally more difficult to discriminate with the Stereotoner than letters are; there was also relatively less emphasis placed on them in formal training. As a consequence, the accuracy with which the trainees were able to decode numbers was lower than the accuracy with which they could decode words.

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*The distribution of words per minute on sentences for both criterion tests can be found in Appendix D. The fastest speed on Criterion Test A was close to 13 WPM. The fastest speed on Criterion Test B was 34 WPM.

TABLE 1

Performance Characteristics of Main Study Participants

		Criterion Test A				Criterion Test B				
		WPM		Accuracy		WPM		Accuracy		
		Sen-tences	Para-graphs	Numbers	Words	Sen-tences	Para-graphs	Numbers	Words	Variety Items
Trainees Who Took Both Tests (N=25)	$\overline{X}$	4.3	2.9	75.9	80.7	6.9	5.7	55.0	66.0	1.1
	S	3.3	2.2	25.1	29.5	7.9	6.5	39.5	37.9	1.4
Trainees Who Took Test A Only (N=5)	$\overline{X}$	1.1	.9	55.4	76.2	-	-	-	-	-
	S	.9	1.2	25.8	23.8	-	-	-	-	-
Both Groups (N=30)	$\overline{X}$	3.8	2.6	72.5	79.9	-	-	-	-	-
	S	3.0	2.1	24.8	28.8	-	-	-	-	-
Hours of Use Before Testing (N=25)	$\overline{X}$	53.8				141.0				
	S	19.2				72.1				

If our previous experience with the training of the blind to read with an electronic device (the Optacon) can be taken as a basis (Weisgerber, et al., 1974), one might theorize that reading rates would continue to double about every six months until a "plateau" of 20 words per minute or so is reached. (This assumes regular usage of about one half hour per day.) Below this level, letter-by-letter decoding tends to dominate over contextual recognition of words.

The second criterion test included seven items involving various print formats and type styles, but most of the trainees could only do one or two of them with any success. To some extent this is not surprising, since the major part of the trainees' program did not involve such materials. Like the other aspects of Stereotoner performance, the ability to do well with difficult print formats can be improved by additional practice and training.

How do drop-outs differ from the trainees who continued study?

The term "drop-out" is used to refer to any participant who left training prior to the end of formal training. Their reasons for doing so are quite varied, but one can summarize them in the following manner:

o Seventeen prospective trainees dropped out during formal training. Their reasons were hearing and emotional problems, other priorities, difficulty in learning the code, and poor academic skill. All but three were male veterans; the average age of the 17 persons was 40, and their average AST score was 35 out of 40 items. (The average age of "stayers" was 34 and their average AST score was 36.)

o Five trainees dropped out during the home study period but are still considered in the main study data in so far as Criterion Test A is concerned. Their reasons for doing so were other priorities at home, inability to make up for poor initial performance, and lack of interest in practicing. Three were female, two were veterans, two were married; their average age was 32, their average AST score was 36; none of them had jobs for which the Stereotoner would have been directly beneficial, and none of them had reached even 3 words per minute at the time of the first criterion test.

The tendency for the drop-outs to be veterans cannot be overlooked. It may be a partial reflection of their age (they tended to be older) or their somewhat poorer hearing (again a function of age). The existence of alternative training programs for the veterans, especially that of the Optacon, was another small contributor to drop-outs in this study. Also, non-veterans had a somewhat greater financial stake in Stereotoner training.

What factors are associated with Stereotoner performance?

Rather than test specific hypotheses regarding the development of good Stereotoner performance, we have chosen to examine a wide range of possible antecedent variables and their association with our criterion test results. Table 2 shows that of the zero-order correlations between background variables and the Stereotoner performance of the trainees, the highest were those pertaining to the age of the individual. Younger trainees are very likely to perform better, that is quite clear. The older trainees tended to have been blind longer, have poorer hearing, have more problems adjusting to the training situation, and have more outside activities that conflicted with training. When we partial out the effects due to age, then variables like marital status, having a sighted person in the home, and not being a veteran no longer exhibit as much impact on Stereotoner performance. This will be discussed in more detail later.

The level of education, the previous auditory experiences, and the written communication skills of the trainees tend to be positively associated with Stereotoner performance as one might expect. Certainly command of the language is necessary for rapid and accurate recognition of words. By definition, learning to use the Stereotoner is an education in auditory communication, and trainees who have had prior experiences which are analogous to such a process should be more likely to do better than trainees who have not. At least they may indicate a general potential for successful training with the Stereotoner. As the next several tables show, there are specific aspects of the Stereotoner training process which must also be taken into consideration.

TABLE 2

Zero-Order Correlations between the Background Characteristics of Trainees and Stereotoner Performance

	Criterion Test A (N=30)				Criterion Test B (N=25)				
	WPM		Accuracy		WPM		Accuracy		
	Sentences	Paragraphs	Numbers	Words	Sentences	Paragraphs	Numbers	Words	Variety Items
Sex	.00	.01	-.03	.23	.06	.13	.09	$.34^{*}$	.07
Age	$-.50^{**}$	$-.41^{*}$	-.28	$-.51^{**}$	$-.49^{**}$	$-.53^{**}$	$-.65^{**}$	$-.64^{**}$	$-.46^{**}$
Age When Blinded	$-.64^{**}$	$-.55^{**}$	-.29	$-.53^{**}$	$-.47^{**}$	$-.49^{**}$	$-.54^{**}$	$-.62^{**}$	$-.40^{*}$
Married	$-.41^{*}$	-.33	-.14	$-.44^{**}$	$-.37^{*}$	$-.42^{*}$	$-.54^{**}$	$-.55^{**}$	-.31
Sighted Person in Home	-.33	$-.40^{**}$	-.08	-.24	-.01	-.09	-.07	-.20	-.08
Non-Veteran	$.46^{**}$	.30	.18	$.50^{**}$	.29	.30	$.45^{**}$	$.55^{**}$	.19
Education Level	.04	.12	.25	$.48^{**}$	.12	.11	.06	.21	.21
Employment	.17	.14	.23	-.03	.06	.04	-.15	-.20	-.08
Previous Auditory Experiences	.26	.20	.13	.06	.32	.28	.17	.26	$.47^{**}$
Written Communication Skills	.32	$.39^{*}$	$.40^{*}$	$.58^{**}$	.04	.00	$.43^{*}$	$.46^{**}$	.09

*p value $\leq$ .05

**p value $\leq$ .01

Table 3 illustrates some of the advantages that could be gained by a proper screening procedure for Stereotoner trainees. The Auditory Selection Test, providing as it does a representation of the auditory cues implicit in Stereotoner performance, has a significant, consistent and positive association with subsequent tests of reading ability.

As one would expect, intelligence tends to be positively correlated with initial Stereotoner performance. However, this correlation is not overly convincing and the magnitude of this association decreases sharply when Criterion Test B results are considered. A special problem in the interpretation of intelligence effects within this sample is that the intelligence scores for the group as a whole are quite high (mean of 134); had the distribution included lower intelligence scores for the adult blind, these correlations might be much higher.

The assessment of the tracking skills of the trainees before training does not seem to have yielded much predictive data about performance, but it should be borne in mind that prospective trainees with severe psychomotor handicaps were not apt to be encouraged to participate in the study. Also, specific tracking mistakes and problems were likely to be corrected during training.

The reading preference measurements that were used related specifically to the ways in which the blind might use devices like the Stereotoner; and as such, there was relatively little variation in the self reports of the trainees. Because none of them indicated an extreme need or lack of need for the kinds of reading the Stereotoner might best facilitate, their initial attitudes about it appear rather noncommittal. This may be the reason for the low correlations.

TABLE 3

Zero-Order Correlations between
Predictor Variables
and Stereotoner Performance

	Criterion Test A (N=30)				Criterion Test B (N=25)				
	WPM		Accuracy		WPM		Accuracy		
	Sentences	Paragraphs	Numbers	Words	Sentences	Paragraphs	Numbers	Words	Variety Items
Auditory Selection Test	$.48^{**}$	$.42^{**}$	$.35^{**}$	$.39^{*}$	$.34^{*}$	$.38^{*}$	$.46^{**}$	$.55^{**}$	$.39^{*}$
Intelligence	.12	.15	$.37^{*}$	.24	.01	-.04	.07	.05	.04
Tracking Test	.03	.01	.08	.20	-.01	.07	.01	-.01	.02
Reading Preference	.02	.01	.06	.21	.04	-.05	-.11	.01	.02

*p value $\leq$ .05

**p value $\leq$ .01

We have not included the correlation of audiogram data with the criterion test scores of the main study cases because there was insufficient variation in the audiogram scores of the trainees. Specifically, none of the 30 trainees who remained in the main study had a decibel loss of 35 or more on any of the tones utilized by the Stereotoner. Below that point, adjustments on the overall volume of the input signal should have been adequate to compensate for inherent hearing problems.

Again, we would emphasize the importance of preselection in terms of training outcomes. The distribution of scores on these predictor variables (see Appendix D) is attenuated at the lower end since there was no intent to provide universal training. Had we attempted to train individuals with poor hearing or psychomotor disabilities, these correlations would have been higher, but the proportion of trainees able to functionally read with the Stereotoner would have been much lower.

Table 4 shows the zero-order correlations between instructional process variables and Stereotoner performance. It is immediately apparent that the number of days of training, and the number of hours studied prior to Criterion Test A are negatively correlated with Stereotoner performance, indicating that shorter amounts of study time are associated with success. At first this may seem surprising since insufficiency of study time is typically detrimental to students. Clearly, this was not the case. One possible explanation for this phenomenon is that the more apt learners studied more effectively and efficiently, while the "extra" time of less apt students was heavily remedial in nature.

The instructional process also has an apparent effect on trainee performance on the second criterion test. The trainees who had little or no trouble in learning to use the Stereotoner during formal training tended to do better over the longer term than those who did have problems. Furthermore, as shown in "Hours of Use before B", consistent and continued practice with the Stereotoner was associated with good performance.

TABLE 4

Zero-Order Correlations between
Instructional Process Variables
and Stereotoner Performance

	Criterion Test A				Criterion Test B				
	WPM		Accuracy		WPM		Accuracy		
	Sen-tences	Para-graphs	Numbers	Words	Sen-tences	Para-graphs	Numbers	Words	Variety Items
No. of Days of Training	-.39*	-.39*	-.30*	-.48**	-.24	-.24	-.52**	-.50**	-.17
No. of Units Completed	.21	.20	.15	.02	.05	.06	.06	.07	-.02
Average No. of Units Per Day	.54**	.56**	.48**	.49**	.24	.23	.50**	.51**	.19
Hours of Use before A	-.33*	-.37*	-.29	-.43**	-.09	-.10	-.30	-.41**	-.06
Hours of Use before B	NA	NA	NA	NA	.59**	.55**	.39*	.44*	.43*
Absence of Problems during Training	.38*	.29	.33*	.13	.42*	.42*	.41*	.34*	.41*

*p value ≤ .05

**p value ≤ .01

Table 5 gives an indication of what factors are important in determining Stereotoner performance after age is held constant. Being married or having a sighted person in the home now appears to have a slight positive effect on trainee performance by the time of the second criterion test. Anecdotal reports indicated that others in the home often acted in a support role by encouraging the trainee to use the Stereotoner more frequently but were not very useful in assisting in home study. Educational level showed some relationship with accuracy, but not with reading rate. Previous auditory experiences appeared to be associated with reading speed and especially so with various print materials. Being employed had a generally positive association with initial performance, but tended to be negatively related to later performance (employment, of course, cuts into the time available for home study).

When age was held constant, both AST and intelligence scores were positively correlated with Stereotoner performance. This is particularly interesting in view of the restricted range of both variables. (see Appendix D) Both tests probably tap important dimensions of ability to use the Stereotoner and should remain as part of the assessment of potential trainee performance.

The influence of variations in formal training follows a predictable pattern. Whether or not a trainee is a veteran made no consistent difference except for a slight tendency for non-veterans to be more accurate in single word decoding (it should be noted that the educational differences between veterans and non-veterans in the sample could account for this particular finding). Quick, accurate mastery of the basic material, plus an absence of personal or physical problems were associated with good performance during formal training. As far as long range performance is concerned, sheer quantity of study time appears to predominate.

TABLE 5

First Order Partial Correlations
of Selected Variables with Stereotoner Performance,
Controlling for the Age of the Trainees

	Criterion Test A (N=30)				Criterion Test B (N=25)				
	WPM		Accuracy		WPM		Accuracy		
	Sen-tences	Para-graphs	Numbers	Words	Sen-tences	Para-graphs	Numbers	Words	Variety Items
Married	.07	.08	.23	.00	.15	.10	.11	.03	.22
Sighted Person in Home	-.19	-.29	.01	-.07	.20	.13	.24	.04	.11
Education	-.05	.06	.22	.47*	.05	.03	-.06	.15	.15
Previous Auditory Experience	.16	.12	.07	-.08	.23	.18	.02	.13	.41*
Written Communication Skills	.27	.35	.37	.57*	-.06	-.12	.41*	.45*	.01
Employment	.26	.20	.27	.03	.13	.12	-.11	-.18	-.03
Intelligence	.29	.30	.48*	.45*	.16	.12	.33	.29	.60**
Auditory Selection Test Score	.26	.25	.24	.13	.07	.11	.13	.28	.17
Non-Veteran	.00	-.10	-.01	.24	-.07	-.10	.00	.20	-.20
No. of Units per Day	.38*	.45*	.41*	.31	-.07	-.07	-.11	-.10	-.14
Absence of Problems in Formal Training	.32	.23	.29	.03	-.02	-.05	.26	.27	-.06
Hours of Use before Criterion Test A	-.16	-.23	-.21	-.28	.14	.16	-.03	-.21	.16
Hours of Use before Criterion Test B	NA	NA	NA	NA	.54**	.57**	.41*	.42*	.42*

*p value ≤ .05; **p value ≤ .01

TABLE 6

Stepwise Regression of Stereotoner Performance on the First Criterion Test on Selected Variables

Dependent Variable: WPM on Criterion Test A

	R	R^2	R^2 Change	r	Beta
Auditory Selection Test Score	.48	.23	.23	.48	.05
Age	.52	.28	.05	-.46	-.31
Intelligence	.54	.30	.02	.12	.16
Number of Units per Day	.59	.35	.05	.52	.31
Hours of Use before Criterion Test A	.59	.35	.00	-.37	-.01

Dependent Variable: Accuracy on Criterion Test A

	R	R^2	R^2 Change	r	Beta
Auditory Selection Test Score	.35	.12	.12	.35	-.47
Age	.46	.21	.09	-.44	-.50
Intelligence	.58	.34	.13	.24	.42
Number of Units per Day	.65	.42	.08	.48	.23
Hours of Use before Criterion Test A	.74	.55	.13	-.58	-.47

Notation:

R = the stepwise multiple correlation, including (as predictors) the variable and all those above it in the table

R^2 = the square of R

R^2 change = the increase in the square of the multiple correlation that resulted from adding the variable as a predictor

r = the simple correlation between the variable and the dependent variable

Beta = the standardized regression coefficient for the variable when the dependent variable is regressed on all five predictors

Table 6 presents the stepwise-multiple regression of AST score, age, intelligence, number of units per day, and overall study time with trainee performance on the first criterion test. Although R's are recomputed as each variable enters the equation, the beta weights shown apply to the final R based on all five predictors. The square of a multiple correlation indexes the proportion of variance in the dependent variable accounted for by the predictors in the equation. Thus the last rows in the first two regression tables show that 35% of the variance in initial reading rate and 55% of the variance in word-by-word accuracy was accounted for by these five predictors.

The relative size of the beta weights is quite different for the two regression solutions. For reading speed, the variables number of units per day and age have the largest beta weights. For accuracy, age has the largest beta weight, but the AST score and hours of use have beta weights that are very close to that of age. The AST score accounts by itself for 23% of the variance in reading speed and 12% of the variance in accuracy, but appears to have a negative weight relative to accuracy on Criterion Test A. This may be due to the inclusion of both age and AST score which themselves are highly intercorrelated. One should note that candidates with extremely low AST scores were not admitted for training. This necessarily had the effect of lowering the actual correlation between possible AST scores and Stereotoner performance. In other words, the AST is probably an even better predictor than these data suggest.

Table 7 indicates how the same five variables together influence Stereotoner performance on the second criterion test. These variables account for 48% of the variance in WPM, 57% of the variance in accuracy and 60% of the variance in decoding variety items. Hours of use is consistently the single biggest contributor to these equations. Additionally, the AST score accounts for 12% of the variance in reading rate, 29% of the variance in accuracy, and 20% of the variance in ability to decode a variety of print materials on Criterion Test B.

Since the independent variables used in these analyses are intercorrelated, the relative size of the beta weights cannot be construed as indications of the relative importance of each variable. With a better "balance" of AST scores, intelligence scores, and ages of trainees,

TABLE 7

Stepwise Regression of Stereotoner Performance on the Second Criterion Test on Selected Variables

Dependent Variable: WPM on Criterion Test B

	R	R^2	R^2 Change	r	Beta
Auditory Selection Test Score	.35	.12	.12	.35	.14
Age	.45	.20	.08	-.45	-.26
Intelligence	.46	.21	.01	.01	.02
Number of Units per Day	.46	.21	.00	.21	.07
Hours of Use before Criterion Test B	.70	.48	.27	.56	.54

Dependent Variable: Accuracy on Criterion Test B

	R	R^2	R^2 Change	r	Beta
Auditory Selection Test Score	.54	.29	.29	.54	.14
Age	.63	.39	.10	-.59	-.30
Intelligence	.63	.40	.01	.05	.03
Number of Units per Day	.64	.41	.01	.49	.31
Hours of Use before Criterion Test B	.75	.57	.16	.39	.41

Dependent Variable: Variety Section on Criterion Test B

	R	R^2	R^2 Change	r	Beta
Auditory Selection Test Score	.45	.20	.20	.45	.19
Age	.47	.22	.02	-.40	-.36
Intelligence	.62	.38	.16	.40	.44
Number of Units per Day	.65	.42	.04	.18	-.12
Hours of Use before Criterion Test B	.77	.60	.18	.49	.44

a far different portrait of the factors relevant to Stereotoner performance might well emerge Also, the influence of some of these variables is deceptive: Number of units per day appears here to have little effect on subsequent performance, but it should be recalled that trainees with learning problems tend to drop out.

Nevertheless, these findings indicate that younger trainees with good to excellent AST scores, no major problems that might interfere with training, and willing to spend an hour or so a day using the Stereotoner, would be the most proficient readers a year after beginning training.

What are the characteristics of those trainees who made acceptable progress?

At the outset of this study, it was decided to allow the pace of instruction to be set by the instructors and the trainees. Thus, other than the encouragement to the individual trainee to use the Stereotoner as much as he or she could, there was no "absolute minimum" as such. However, a rough benchmark of what we would call "acceptable progress" during formal training was the mastering of one unit of instructional material a day. During home study, three or more hours a week of Stereotoner usage would have been advisable. Using these as reference points it is possible to compare and contrast those trainees who met or did not meet these guidelines.

Table 8 displays the characteristics of trainees who did or did not master at least one instructional unit during each day of formal training. The older trainees, and those who had been blind for many years, were apt to find this pace too demanding for them. Similarly, the trainees who had lower AST scores were unable to meet and maintain this one-a-day pace.

In terms of how the "on schedule" and "behind schedule" groups did on criterion performance, it is clear that the slower students did not do as well on rate or on accuracy. During home study the same group that was unable to keep a one-unit-a-day pace studied longer than the "on schedule" students, but not enough more to make any important difference. However, they were still only reading at half the WPM of the faster group by the end of Criterion Test B. Their accuracy had also dropped to the point where they only read about half of the words correctly, significantly poorer than the faster students.

TABLE 8

Characteristics of Trainees Who Did or Did Not Master at Least One Unit a Day during Formal Training+

	Less than One Unit			One Unit or More			
	$\bar{X}$	S	N	$\bar{X}$	S	N	t
Sex	1.3	0.5	20	1.5	0.5	10	1.0
Age	38.5	13.6	20	27.0	10.6	10	2.3*
Onset of Blindness	2.3	0.9	20	1.3	0.7	10	2.9**
Married	1.6	0.5	20	1.2	0.4	10	1.9
Sighted Person in Home	1.8	0.4	20	1.5	0.5	10	1.7
Education	3.5	0.8	20	3.6	0.7	10	0.5
Previous Auditory Experience	1.2	0.7	20	1.3	0.7	10	0.4
Written Communication Skills	2.0	0.5	20	2.3	0.5	10	1.8
Employment	2.4	0.7	20	2.0	0.8	10	1.2
Intelligence	133.5	8.2	18	134.3	12.1	9	0.2
Auditory Selection Test Score	34.6	3.9	20	38.3	2.2	10	2.8**
Absence of Learning Problems	2.2	0.6	20	2.4	0.8	10	0.7
WPM on Criterion Test A Sentences	2.8	2.9	20	5.7	3.3	10	2.5*
Word Accuracy on Criterion Test A	72.2	33.5	20	95.3	2.8	10	2.2*
Hrs. of Study before Criterion Test B	142.7	76.8	16	128.0	99.7	9	0.4
WPM on Criterion Test B Sentences	5.3	8.9	16	10.0	6.8	9	1.3
Word Accuracy on Criterion Test B	53.0	43.7	16	89.2	18.1	9	2.4*
Variety Items on Criterion Test B	0.8	1.2	16	1.7	1.7	9	1.5

+ See Appendix C for interpretation of scale values.

*p value $\leq$ .05; **p value $\leq$ .01

In Table 9, the sample has been divided according to the amount of home study that the trainees did each week. There is little difference between the two groups in terms of membership or background characteristics, thereby indicating that the frequency of usage of the Stereotoner at home was more a matter of individual choice than of any systematic factor. The effect of regular, sustained home study on performance, however, is quite clear: those who did not practice at least three hours a week were only reading at 3.2 WPM on Criterion Test B, whereas the trainees who were able to maintain a pace of three hours or more of Stereotoner usage in the home were averaging 9.0 WPM.

Table 10 shows what happens when critical factors in selecting Stereotoner trainees are taken into account. Theoretically, trainees would not have been selected properly if they had one or more of the following inadequacies: 1) an AST score of less than 32 out of 40 (80% right), 2) a major learning block readily detectable in early training, or 3) a failure to put in three hours a week of home study following formal training. The last two criteria involve post hoc observations but could become a consideration in future initial trainee interviews. Out of the 25 trainees who took both criterion tests, two had AST scores lower than 80% correct, six had some type of block in learning the Stereotoner code, and nine were putting in less than three hours a week of home study. Allowing for overlap of criteria, this means that 15 out of the 25 trainees were not fully able to make an effective effort at learning to use the Stereotoner.

The differences between the two groups shown in Table 10, in terms of performance, is rather striking. The trainees who fell short on the criteria actually tend to decrease in both reading rate and accuracy over the long term, whereas the trainees who surpassed the criteria gained in both reading rate and accuracy. Also, the group without problems shows more promise in ability to read a variety of ink print materials, rate and accuracy.

In summary, the ability to differentiate the tones meaningfully, the ability to overcome learning difficulties, and the willingness to practice diligently appear to be keys to success with the Stereotoner.

TABLE 9

Characteristics of Trainees Who Did or Did Not Spend at Least Three Hours a Week in Home Study

	Less than Three Hrs.			Three Hours or More			
	$\bar{X}$	S	N	$\bar{X}$	S	N	t
Sex	1.2	0.4	9	1.4	0.5	16	0.8
Age	34.7	13.1	9	35.4	14.7	16	0.1
Onset of Blindness	1.8	1.0	9	1.9	1.0	16	0.2
Married	1.4	0.5	9	1.4	0.5	16	0.0
Sighted Person in Home	1.6	0.5	9	1.8	0.4	16	1.4
Education	3.3	0.9	9	3.5	0.8	16	0.5
Previous Auditory Experience	1.2	0.8	9	1.3	0.7	16	0.1
Written Communication Skills	2.2	0.7	9	2.0	0.5	16	0.9
Employment	2.4	0.7	9	2.3	0.8	16	0.4
Intelligence	139.3	7.9	8	131.1	10.1	14	2.0
Auditory Selection Test Score	36.6	3.2	9	35.4	4.4	16	0.7
Absence of Learning Problems	2.4	0.5	9	2.4	0.7	16	0.3
Hrs. of Study before Criterion Test A	48.9	10.0	9	56.7	22.7	16	1.0
WPM on Criterion Test A Sentences	5.0	3.7	9	4.0	3.2	16	0.7
Word Accuracy on Criterion Test A	73.2	41.0	9	84.9	23.7	16	0.9
WPM on Criterion Test B Sentences	3.2	5.3	9	9.0	9.2	16	1.7
Word Accuracy on Criterion Test B	48.4	39.7	9	75.9	38.2	16	1.7
Variety Items on Criterion Test A	0.7	1.6	9	1.3	1.3	16	0.9

TABLE 10

Comparison of Subgroups Based Upon Auditory Selection Test Scores, Absence of Learning Problems and Adequate Study Commitment

	At Least One Major Inadequacy (N=15)		No Known Inadequacy (N=10)		
	$\overline{X}$	S	$\overline{X}$	S	t
WPM on Sentences - Criterion Test A	3.7	3.3	5.2	3.3	1.1
Accuracy on Words - Criterion Test A	72.5	37.4	93.0	7.5	1.7
WPM on Sentences - Criterion Test B	2.9	4.6	12.9	9.4	3.5^{**}
Accuracy on Words - Criterion Test B	46.5	41.6	95.4	5.0	3.7^{**}
Variety Items on Criterion Test B	0.6	1.3	1.9	1.2	2.5^{*}

*p value $\leq$ .05

**p value $\leq$ .01

IV. CASE STUDIES

Overview of the Case Studies

As pointed out previously, this study has limitations on analyses and generalization attributable to a low N and other factors. It was therefore deemed appropriate and useful to present case study information so that a better feeling could be gained for the complexity of the training being undertaken, the reactions of individuals, the types of problems and experiences encountered, and the probable causality underlying different trainees' progress or lack of it.

As might be expected, the case studies reveal a great diversity among the trainees in their life style, their approach to training, their motivation to achieve, and their level of expressed satisfaction. Before looking at selected case studies presented elsewhere in this section (or at the additional case studies included in Appendix E for readers who might wish to read further) it would be helpful to summarize some of the "trends" that seemed to emerge from the anecdotal data.

- With few exceptions, the trainees looked forward to the Stereotoner training with optimism and interest. Many, including those who ultimately performed well, found themselves discouraged at some point (often by the end of the first week) when the learning process was proving to be more difficult than anticipated. Whether they overcame this disappointment and continued to apply diligent effort and steady growth was a large determinant in their eventual mastery of the system.
- With few exceptions, the trainees thought tracking alignment and steady camera movement was a source of frustration and an impediment to learning of the code. Nevertheless, much information about the code (e.g., word length) comes partly through kinesthetic sensation; consequently tracking for the trainee was not a viable alternative.

- Even though the absolute reading rates attained were generally slow by comparison to braille or other conventional information acquisition means, many of the trainees were very proud of the initial independence in reading that they had gained. A number stated that the modest speeds they reached were adequate to meet their needs vis a vis reading of mail or checking of typing.

- Whether due to outside pressures, release from supervised instruction or other reasons, it is clear that many of the trainees failed to follow through in a disciplined manner in the home study context. Realistically, this phenomenon has long been recognized in connection with correspondence and other home study courses. Here, however, lack of practice could, and did in some cases, lead to a diminishing of the skill or even to the point where the trainee was unable to read at all.

- Marked differences existed relative to the instructional strategies, materials, and training schedules used for the three Special Cases (two of which were in public education and one of which had partial instruction from the manufacturer) as compared to the Main Study Cases. Nevertheless, the progress and reactions of the Special Cases and Main Study Cases were similar in most aspects. This would suggest, though clearly not proven, that a) a variety of training approaches could be used, b) sighted as well as blind instructors might be used, and c) rather young students may learn to use the Stereotoner provided they are able to apply the necessary fine motor skills.

On the following pages, the three Special Cases are described in greater detail (they are not included in the results reported in Section III), followed by an example of a high and low performing non-veteran and a high and low performing veteran. There is no intention to show differences between veterans and non-veterans but rather to illustrate the range of performance and types of problems that can be expected within each group. Similarly, no negative inferences should be drawn about the low performers for they were capable people in other ways, even though they were simply not able to acquire desired levels of reading performance with the Stereotoner.

It is important to keep in mind that the four main study cases selected for presentation in the body of this report differ not only from each other but also from the mean performance of the main study group. Tables 11 and 12 have been included to help in the contrasting of these cases and in comparing them to the main study group as a whole. These tables are presented following the individual case reports for the high performing and low performing non-veterans (Table 11) and the high performing and low performing veterans (Table 12).

Finally, all names used are fictitious and identifier data have been expunged. All had agreed to full participation and the collection of data before entering the study; nevertheless, the AIR staff believe that their anonymity should be protected.

Special Case - Max P. (Public School Instructor)

Overview: Forty-two year old Max P. has been blind since birth. He has a master's degree in special education and works as a resource teacher with visually handicapped children in the public schools. Max is married. As a college student in 1954, Max participated in research being conducted by one of his professors which involved decoding audible tonal output from a typewriter-like device. He said the sounds produced by this device were very similar to the tonal pattern produced by the Stereotoner. Max reads grade two braille at an average rate. He uses a cane daily for traveling outside his home.

Max was trained in Stereotoner usage by a sighted special education teacher and the instructional schedule and methods varied from those used with cases in the main study. He made steady progress and his reading rate at completion of formal training was somewhat above average. Max did not work in the Home Study Manual. His practice during the nine months following formal training was consistent, but was limited in both content and study time. In addition to independent study, Max spent time each week training one of his own fifth grade students to read with the Stereotoner. His attitude was positive and he had a good understanding of the basic skills required. However, due to limited study time, his own reading speed did not increase markedly following formal training.

Pretraining tests: Max's score on the verbal portion of the WAIS was at the 97th percentile. An audiometric test revealed no significant hearing loss. His score on the Auditory Selection Test indicated good potential for successful Stereotoner training. His tracking test results were slightly below average. On the Reading Preference Inventory, Max indicated that most reading tasks were very important to him and were currently being done by someone else. He also indicated that he would prefer greater reading independence in all areas.

Progress during formal training: Max spent 24 days in formal training and worked with his instructor for $1\frac{1}{2}$ to 2 hours per day. He completed ten units in the basic Instructional Manual and his average study time for the first eight units was 3 hours per unit. He spent 15 hours on the unit on building reading speed and 7 hours on the numbers unit. His instructor was sighted and the reflex viewer was used in training. Max was dissatisfied with the tracking aid and magnetic board and began experimenting with different methods and equipment. He oriented easily to the Stereotoner and showed good tracking ability. His approach was very analytical and he preferred to decode letters rather than scan or look for word patterns. This slowed his reading somewhat, but he progressed through the basic alphabet units with minimal difficulty. He complained at having to adjust lamp intensity frequently in order to maintain a clear audio image and became confused at the introduction of smaller print and closer spacing in unit five. Max spent additional time on his own working on these problem areas and was able to maintain steady progress. He spent considerable time in the unit on building reading speed, trying to overcome his tendency to read letter-by-letter. He practiced recognizing the tone patterns in the "Most Common Word List." Max's attitude was positive and his grasp of the material continued to improve. His reading rate at the completion of formal training was 5.7 WPM for sentences and 4.4 WPM for paragraphs.

Follow-up to formal training: Following his own formal training, in his capacity as a resource teacher, Max instructed an 11 year old student in the use of the Stereotoner. His teaching time averaged 1 to 1½ hours per week in the year following his training. In addition, he spent approximately 15 minutes a day reading in a large print book. He did very little reading of other materials and he did not use the Home Study Manual. He did begin to use the Stereotoner to check his typing. His reading rate 9 months after formal training had increased to 7.7 WPM for sentences and 6.6 WPM for paragraphs. At this time he was very self-assured in his use of the equipment. His tracking and line change skills were excellent and he read with ease. He had some difficulty setting for different type sizes, which he attributed to his failure to practice with a variety of print materials. His attitude toward the Stereotoner and his own progress was very positive.

Max expressed general satisfaction with his formal training. He felt that with proper training a sighted person could teach Stereotoner reading skills. He commented that he had needed more adequate instructional assistance in learning how to align the equipment and adjust controls. He noted that the reflex viewer was awkward to use due to its height off the table and that he soon stopped using it. Max had made several modifications in the standard equipment. He attached a cylindrical plastic medicine container to the side of the Stereotoner. This served as a convenient holder for the camera when the reader wished to pause briefly. Max also developed his own tracking apparatus which consisted of a wooden board and a double T-square which slid up and down vertically (remaining in alignment with the sides of the board) and pressed the page downward onto a rubber mat.

This trainee maintained a relaxed and positive attitude throughout his own training. His attitude was reflected in his teaching approach. He saw the Stereotoner as a useful tool in daily living and was optimistic in his estimate of its future usefulness and of his own ability to develop reading skill.

Special Case - Michael R. (Public School Student)

Overview: Michael R., the only child participating in the study, was a fifth grade student in public school when he begain training. Michael has cataracts and has been blind since birth. As a part of his school program he has had training in communication skills and mobility. He reads grade two braille at a rate considerably above average, and although his travel is restricted due to his age, his parents encourage his independence in all areas. His musical background includes lessons in trumpet and ukelele.

Michael is a very active and confident youngster, and was enthusiastic at the prospect of learning to read with the Stereotoner. While he was in the study, his training consisted of several short sessions of instruction per week, and extended over a period of 16 months. Michael used study materials adapted for his grade level. His progress was steady and he showed good ability in the areas of letter recognition, tracking and alignment, and lamp adjustment.

Pretraining tests: Michael's score on the verbal portion of the WISC was slightly above the 90th percentile. An audiometric test revealed good hearing in all ranges. His score on the Auditory Selection Test indicated excellent potential for successful Stereotoner training. Tracking test times were slower than average times obtained for adults, however, he was able to maintain a straight path. On the Reading Preference Inventory Michael indicated that many reading tasks were important to him and that he would prefer to be able to perform them for himself.

Progress during formal training: Michael's formal training began in March. When the regular school year ended he took a short break and then resumed training for a short summer session in July. He began regular instruction again in the fall. Instruction periods lasted from 15 to 30 minutes during the school year; longer during the summer. Michael's instructor was a regular resource teacher in his school district, who had recently completed Stereotoner training.

Michael oriented easily and quickly to the Stereotoner and enjoyed experimenting with the light probe on different shapes and symbols. He began reading large print consisting of the letters in his name. He used an adapted set of instructional materials drawn from the AIR Optacon Manual (Elementary Level), the Stereotoner Instructional Manual, and language arts readers appropriate to his grade level, as well as other materials created by his instructor. Emphasis was placed on a whole-word approach with considerable repetition of words in a limited vocabulary. Story-type materials were used as soon as Michael had achieved enough proficiency to maintain the thread of meaning in connected text. By the end of the school year Michael had received approximately thirteen hours of training and was reading accurately and enjoying the material he covered.

Michael completed twenty hours of training during summer session, working an average of 2¼ hours per day. During this time he began to scan words and some increase in speed was noted.

When school started, Michael again began to work in 15- to 30-minute sessions, several times a week. At this time he was reading material retyped in large print from a book called Jim Forest and Ranger Don, and he was also working on the common word list. He was timed at 12 WPM on this list. Michael had found it beneficial to use a double T-square tracking aid which his instructor developed, and will probably continue to use it indefinitely. In November, his reading rate for story-type material was timed at 7 WPM. During the next two months his schoolwork showed a general decline, and he seemed to reach a plateau in reading progress. When his attitude toward school improved, so did his interest in the Stereotoner. However, for the next few months his rate on timed readings fluctuated between 4 and 7 WPM. He was able to work for longer periods of time, and was reading selections of several pages at one sitting.

Michael's Stereotoner had to be sent for repair in April, and he was unable to practice for three weeks. This resulted in a drop in reading speed, but after a week of practice he was again reading longer selections at a timed rate of 10 WPM. This was near the end of his 16-month training period.

Follow-up to formal training: Michael was visited at his school at the end of his sixth grade year. His Stereotoner had been sent for repair, and at the time of the visit he had no practice and only one 20 minute lesson the preceding month. He appeared very relaxed and confident, although he said he knew he needed regular practice in order to read well. He took an adapted criterion test consisting of several short paragraphs of age appropriate material. Michael's timed reading rate was 2 WPM for unfamiliar text, and 4.2 WPM for familiar text which he had not read before. The slow speeds were a result of his getting stuck on particular words and persisting with them rather than moving on to ones he was able to recognize. He apologized for his performance and said he was "rusty." During this test he was very adept at alignment, line change, and lamp adjustment. He had not received instruction in adjusting for typesize, since the bulk of his reading matter was all in large print format.

His views about the Stereotoner were realistic and favorable. He planned to continue reading for pleasure and practice.

Special Case - Sylvia S. (Training initiated by manufacturer)

Overview: Sylvia S. was 22 at the time of the study. She has been blind since birth from retrolental fibroplasia. Sylvia had her Stereotoner for more than a year when she entered formal training. She had previously received limited instruction from a manufacturer's representative and was therefore considered a special case in the present study. Sylvia, a college graduate, was working temporarily as an administrative assistant. She has a rather extensive musical background and plays several instruments. Her grade two braille speed was estimated to be considerably above average. Sylvia lived with her parents and traveled outside her home daily using a cane.

This trainee evidenced a lack of self-confidence, even though she had good ability. She consistently set very high standards for herself and was self-critical of the slightest failure. Progress in formal training was average, and when she was tested five months later, her reading rate had more than doubled. She worked slowly but steadily in the Home Study Manual and used the Stereotoner daily for reading tasks at home and at work.

Pretraining tests: Sylvia's score on the verbal portion of the WAIS was at the 75th percentile. An audiometric test revealed no hearing loss in any range. Her score on the Auditory Selection Test indicated excellent potential for successful Stereotoner training. Tracking test scores were erratic with rates being slower than average. Sylvia's responses on the Reading Preference Inventory indicated a desire for more reading independence in areas of daily living skills (e.g., reading package labels, personal and business correspondence, etc.).

Progress during formal training: One year prior to entering formal training, Sylvia had studied intermittently for three months with a manufacturer's representative. She used the basic Instructional Manual which had been developed for the present study and, with minimal assistance, progressed through Unit Four and the basic alphabet. Having made slow progress on her own, she decided to enter training with an instructor.

Sylvia remained in formal training for 13 days and progressed into the unit on equipment operation and utilization. Because of previous experience, she needed no orientation and began studying in the first alphabet unit immediately. She spent an average of four hours on each unit, devoting considerable time to the unit on additional typefaces, which was difficult for her. Sylvia experienced no difficulty with the code and her tracking and alignment skills developed rapidly. Her proficiency with magnification and lamp control remained somewhat of a problem. Although she showed good ability, Sylvia's lack of self-confidence slowed her progress. She was extremely tense early in training but became more relaxed as she worked with the Stereotoner. Her anxiety returned during testing throughout training, yet her determination to master the necessary skills remained strong. Sylvia's reading rate at the completion of formal training was 4.8 WPM for sentences and 2.7 WPM for paragraphs.

Follow-up to formal training: In a telephone interview two months after formal training Sylvia reported that although she found training to be generally satisfactory, she would have preferred a less concentrated schedule. Although performing at an average level, she had not felt comfortable leaving formal training. She reported that magnification and lamp adjustment were still a problem for her. She had begun the units in the Home Study Manual, and was finding the work difficult. The schedule set up for completion of the home study materials was too demanding and she was experiencing frustration. She felt best when able to work slowly and carefully and she did not like to read for speed. She continued to work slowly in the Home Study Manual, averaging about 10 hours per month.

When visited in her home five months after the completion of formal training, Sylvia had not completed the first unit in the Home Study Manual, but she was using the Stereotoner daily. She still expressed some dissatisfaction with her reading progress and lack of confidence in her ability. Her meticulous style seemed to hinder speed development as she was unable to tolerate slight misalignment or lamp adjustment problems. Sylvia's reading rate at this time had increased to 12 WPM for sentences and 7 WPM for paragraphs.

Although this trainee possessed above average ability, her unwillingness to risk making a mistake slowed her progress considerably. Failures, real or imagined, were the source of anxiety. She did possess strong determination and a willingness to practice, which were expressed in an increase in reading speed over a relatively short period.

Main Study Case - Harold J. (High performing non-veteran)

Overview: Harold J., a 23 year old college graduate, has been blind since infancy from retrolental fibroplasia. At the time of the study he lived with his parents and was employed as a service management trainee with a sales organization. Harold has a rather extensive musical background and plays a variety of instruments. He knows Morse code but has had no previous experience with reading devices. His grade two braille reading speed is estimated to be average, and he is a competent cane traveler.

Harold was a slow, careful worker who made limited but steady progress during formal training. He continued to practice daily with the Stereotoner and completed the Home Study Manual. As Harold developed confidence, he began to read for speed. His reading rate increased from slightly more than 2 WPM at the end of formal training to 34.3 WPM one year later. This exceptional increase is clearly a credit to his concerted effort and commitment to practice and use.

Pretraining tests: Harold's score on the verbal portion of the WAIS was above the 97th percentile. An audiometric test revealed no important hearing loss in either ear. His score on the Auditory Selection Test indicated good prospects for successful Stereotoner training. Tracking test scores were average. On the Reading Preference Inventory, Harold indicated a desire for more reading independence in most areas.

Progress during formal training: Harold spent 15 days in formal training and progressed into the unit on additional typefaces before leaving. He completed each of the first nine basic units in approximately five hours, but spent considerably more time in the units on building reading speed and additional typefaces. His reading rate upon completion of formal training was 2.2 WPM for sentences and 2.4 WPM for paragraphs. In the beginning, he tended to work very carefully, puzzling over each letter and backtracking frequently. He corrected this tendency somewhat as training progressed, and began to develop an even pacing rhythm with minimal tracking and alignment problems. He also realized that the code was more easily understood when tracked at a smoother, faster rate. During the third week of training, Harold was developing skill in reading for content and was able to work independently for extended periods.

Follow-up to formal training: In a telephone interview one month after formal training, Harold expressed a general satisfaction with his training experience. He said that the training had been difficult and intensive, but felt that such a program was necessary in order to acquire basic skills. He said he had been discouraged with his progress early in training, but had since become more convinced of the device's potential and his own developing ability to use it. He had been using the Stereotoner at work to read labels, bulletins, and booklets. He had not continued studying in the basic Instructional Manual.

In the year following formal training, Harold reported a consistent practice and use time of one hour per day. He spent an average of 8-1/2 hours per month on the Home Study Manual and completed all four units in eight months. His remaining practice time was spent reading personal mail, books, and magazines, and checking his own typing. He was taking a computer programming course and reported that he was able to read computer printouts with no difficulty. He also used the Stereotoner to do his homework.

In an interview in his home one year after formal training, Harold's attitude toward the Stereotoner was realistic and positive. He felt that the time and effort involved in training and home study had been well spent, and he was satisfied with his progress and ability to use the Stereotoner. At the time of his home visit, Harold's reading rate had increased to 34.3 WPM for sentences and 25.2 WPM for paragraphs. This was the most significant increase achieved by any trainee.

During formal instruction this trainee concentrated on mastery of basic skills. As his skill developed he shifted to an emphasis on building reading speed, forcing himself to work at a faster pace and concentrating on recognizing whole word patterns. His conscientious practice was in line with project recommendations. The result was an exceptional increase in overall reading ability.

Main Study Case - Polly M. (Low performing non-veteran)

Overview: Polly M., who was 47 at the time of the study, became blind at the age of 14 from retinal degeneration. Polly is married and has five children. Sighted assistance is available in the home. She has a bachelor's degree and is employed as a social worker. Polly reads grade two braille at a rate slightly above average and travels outside her home daily, using a cane.

This trainee was able to understand the code and progressed at an average rate in formal training. She did, however, experience continued problems with tracking and alignment which hindered the development of reading speed. She did not continue with regular practice, partially due to the demands of a job and a large family. Nine months after completion of formal training, her reading rate had increased slightly.

Pretraining tests: Polly's score on the verbal portion of the WAIS was above the 97th percentile. An audiometric test revealed no hearing loss in either ear. Her score on the Auditory Selection Test indicated good prospects for successful Stereotoner training. Tracking test scores were somewhat below average. On the Reading Preference Inventory, Polly indicated that although many daily reading tasks were important, they were currently being done for her by someone else and she had very little desire to do them independently.

Progress during formal training: Polly spent 14 days in formal training and progressed into the unit on equipment operation and utilization. She worked an average of four hours on each of the units, spending the most time on the unit concerned with building reading speed. Polly's reading rate at the completion of formal training was less than 1 WPM for sentences. Due to difficulty with line change, she was unable to read paragraphs and a reading rate was not obtained.

Although familiar with the shape of print letters, Polly had problems initially with relating letter shapes to tone patterns. She had trouble listening to the code while manipulating the camera and tracking aid. Tracking problems continued throughout training and she had difficulty with lamp adjustment. Although Polly understood the code, and could identify letters even when somewhat out of alignment, dexterity problems prevented development of reading speed.

Followup to formal training: In a telephone interview one month after formal training, Polly indicated that she had expected proficiency with the Stereotoner to come more rapidly. She said that listening and tracking at the same time was difficult for her, and that she felt she had needed more practice in the beginning on tone discrimination alone. She was reading a large print sewing book at work. She was continuing to study in the basic Instructional Manual for a half hour each day, but had not begun work in the Home Study Manual.

In an interview in her home nine months after completion of formal training, Polly expressed disappointment with the Stereotoner, saying it was not a practical device for her. She had used the Stereotoner at work occasionally, but had not established a regular or systematic study program. She had not attempted to work in the Home Study Manual. At the time of the home interview Polly was able to decode words but with some difficulty. She was still experiencing tracking problems and her reading rate was approximately 2 WPM.

TABLE 11

Performance Profiles of an Above-Average Non-Veteran and a Below-Average Non-Veteran

		Main Study Distribution				
Harold J.	**Scores**	**-2 S.D.'s**	**-1 S.D.**	**Mean**	**+1 S.D.**	**+2 S.D.'s**
Age	23.00	7.39	21.03	34.67	48.31	61.95
Intelligence	130.00	114.84	124.31	133.78	143.25	152.72
Auditory Selection Test	35.00	28.20	32.00	35.80	39.60	43.40
Number of Units per Day	0.79	0.27	0.58	0.89	1.20	1.51
WPM on Criterion Test A Sentences	3.20	0.0	0.66	3.92	7.18	10.44
Hrs. of Study before Criterion Test A	69.50	14.37	34.42	54.48	74.53	94.58
WPM on Criterion Test B Sentences	34.30	0.0	0.0	6.91	15.30	23.69
Hrs. of Study before Criterion Test B	287.33	0.0	60.76	142.48	224.20	305.92
Polly M.	**Scores**	**-2 S.D.'s**	**-1 S.D.**	**Mean**	**+1 S.D.**	**+2 S.D.'s**
Age	47.00	7.39	21.03	34.67	48.31	61.95
Intelligence	130.00	114.84	124.31	133.78	143.25	152.72
Auditory Selection Test	35.00	28.20	32.00	35.80	39.60	43.40
Number of Units per Day	0.86	0.27	0.58	0.89	1.20	1.51
WPM on Criterion Test A Sentences	3.50	0.0	0.66	3.92	7.18	10.44
Hrs. of Study before Criterion Test A	41.00	14.37	34.42	54.48	74.53	94.58
WPM on Criterion Test B Sentences	2.60	0.0	0.0	6.91	15.30	23.69
Hrs. of Study before Criterion Test B	74.00	0.0	60.76	142.48	224.20	305.92

Main Study Case - Wesley J. (High performing veteran)

Overview: Wesley J., a 53 year old veteran, has been blind since he was 23 from trauma in combat. He has no handicaps other than his blindness. Wesley, who attended college for two years, manages his own insurance business and travels to his office daily using a cane. He is married. His grade two braille reading speed is estimated to be slightly below average.

This trainee, who had no rehabilitation training for many years, came to the rehabilitation center to upgrade his general living skills. He became involved in several aspects of rehabilitation training while in residence at the center. His enthusiasm and excitement at so many new experiences disrupted his sleep and distracted him during the day. His progress was much slower than average. He was unable to demonstrate functional reading ability at the completion of this first phase of instruction. However, he continued to practice at home daily and returned to the center for additional training seven months later. Continuing with daily practice he completed the Home Study manual and was able to begin using the Stereotoner functionally in his business and personal life. This trainee wes outstanding in his persistent refusal to be deterred by slow progress.

Pretraining tests: Wesley's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test revealed mild hearing loss in the right ear at the 3000HZ range. Wesley's score on the Auditory Selection Test indicated fair prospects for Stereotoner training. Tracking test scores were average. On the Reading Preference Inventory, Wesley indicated that he would like to have greater reading independence in tasks relating to his work (e.g., brief typed memos or case histories, proofreading own typing, etc.).

Progress during formal training: Wesley completed formal training in two phases. The first phase consisted of a four week period during which he spent 15 days in actual instruction. During this period he was not able to complete the basic alphabet units and did no work with numerals. His reading skill at that time was insufficient to warrant administration of a timed test. Wesley was excited at being at the center and became overstimulated and unable to sleep. This resulted in frequent exhaustion which made it impossible for him to concentrate. During this time he was able to upgrade his braille and mobility skills, but his attention was clearly too divided to allow him to progress with the Stereotoner. He decided to go home and work on his own, planning to return at a later time for additional instruction. The second phase of training occurred seven months later. In the interim, Wesley had completed the basic Instructional Manual on his own. He returned to the center for four days and concentrated work was done on special tasks and selected items from the units on new formats and equipment utilization. His reading rate at this time was 3.9 WPM for sentences and 3.3 WPM for paragraphs. He was doing well with the code, and his tracking, while still deficient, was much improved. His overall performance at this time was still considered to be marginal, but his attitude was very positive and his motivation strong.

Follow-up to formal training: In the seven month interval between the first and second phases of his training, Wesley followed a consistent and structured study pattern. Except for one month, when he developed an ear infection, his average study time was one hour per day. This was primarily in the basic Instructional Manual, but as his skill developed he began to supplement his practice by reading forms and business correspondence.

In a telephone interview two months after completion of the second phase of his formal training, Wesley was enthusiastic and highly realistic in his self-appraisal. His slow progress had been disappointing at first, but he found the Stereotoner to be "fun, a challenge to work with." He had begun the Home Study Manual and was increasingly able to use the Stereotoner in his work.

Wesley completed all four home study units in seven months. His study time averaged one hour per day. His tracking and control adjustment steadily improved and his reading rate on some selections was very rapid.

In an interview in his home six months after the completion of the second phase of his formal training, Wesley indicated the Stereotoner was becoming a functional part of his work-related activities. He expressed satisfaction with his progress and stressed the need for a combination of regular practice and use. His reading rate at this time was 9 WPM for sentences and 7 WPM for paragraphs. He accomplished alignment, tracking, and control adjustment with ease, and had no difficulty with the code.

This trainee was strongly motivated to succeed and refused to be deterred by slow progress. His eventual performance is clearly the result of his determination and persistent dedication to regular practice and use. The flexibility of his training schedule allowed him to progress at his own pace and contributed to his ultimate positive appraisal of the Stereotoner.

Main Study Case - Ted C. (Low performing veteran)

Overview: Ted C. is a 47 year old veteran. At the time of the study, he had been legally blind for three years due to diabetic retinopathy. A low vision evaluation showed that Ted could read print slowly using closed circuit television at highest magnification. He chose Stereotoner training over training on closed circuit television since there was a possibility that his vision would deteriorate. Ted lives with his wife and children. He is a high school graduate, and since losing his vision has taken several courses at a local junior college. These courses were primarily to help him in his present job as a salesman. His musical background is not extensive. He learned Morse code while he was in the service. Ted travels outside his home daily using a cane.

This trainee progressed at an average rate during formal training. Although his reading rate at the completion of formal training was somewhat below average, he appeared to be well motivated. He did not continue to practice daily, however, and his reading proficiency decreased. In an interview in his home nine months after formal training, Ted reported that he had felt the need for more instructional support during home study.

Pretraining tests: Ted's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test revealed no hearing loss. His score on the Auditory Selection Test indicated excellent prospects for successful Stereotoner training. Tracking test scores were average. On the Reading Preference Inventory, Ted indicated that he would like to have more reading independence in areas relating to daily living, such as reading labels on packaged goods, medicine labels, short magazine articles, and identifying currency.

Progress during formal training: Ted spent 17 days in formal training and completed the unit on equipment operation and utilization in the basic Instructional Manual. He spent an average of five hours on each unit, devoting the most time to the unit on building reading speed. Ted's dexterity was good and he oriented easily to the Stereotoner. Initially he had no serious difficulty with letter recognition and his tracking and alignment skills developed steadily. In later units, Ted had some problem adjusting to smaller print. He began to show signs of frequent fatigue and his performance became somewhat erratic. Ted's reading rate on completion of formal training was 2.0 WPM for sentences and 2.2 WPM for paragraphs.

Follow-up to formal training: In a telephone interview one month after formal training, Ted reported that his training had been comprehensive and interesting. He did not feel completely confident leaving the training situation and would have preferred remaining for an additional week of instruction. He said he had not realized at the beginning of training how much time and effort would be required to become a proficient reader. At the time of the phone call, Ted had begun working in the Home Study Manual and was also trying to read typed correspondence, business cards, and a reference book used in his work.

Ted did not maintain a regular study schedule after leaving formal training. His practice and use time dropped to one hour per week three months after training, and after that he reported only occasional efforts to read with the Stereotoner. After a brief attempt with the Home Study Manual, Ted limited his sporadic practice to magazine articles and selected short stories. He reported that he had not felt ready to begin independent study upon completion of his formal training and that he needed more structure and instructional assistance during home study.

In an interview in his home nine months after formal training, Ted expressed disappointment at his failure to become a proficient Stereotoner reader. He felt that his lack of progress was a result of insufficient practice. Although he accepted full responsibility for not practicing, he emphasized that he had felt a very strong need for more support during home study. At the time of his home visit, Ted was able to properly adjust the controls on his Stereotoner and maintain correct alignment. He used a letter-by-letter approach to reading, and was able to identify words in this way. However, his reading rate was very slow, having dropped to 1.0 WPM for sentences and 1.5 WPM for paragraphs. Although Ted's ability and motivation appeared to be above average, his inability to maintain a regular pattern of practice and use resulted in the loss of skills acquired in training.

TABLE 12

Performance Profiles of an Above-Average Non-Veteran and a Below-Average Non-Veteran

		Main Study Distribution				
Wesley J.	Scores	-2 S.D.'s	-1 S.D.	Mean	+1 S.D.	+2 S.D.'s
Age	53.00	7.39	21.03	34.67	48.31	61.95
Intelligence	144.00	114.84	124.31	133.78	143.25	152.72
Auditory Selection Test	32.00	28.20	32.00	35.80	39.60	43.40
Number of Units per Day	0.30	0.27	0.58	0.89	1.20	1.51
WPM on Criterion Test A Sentences	3.90	0.0	0.66	3.92	7.18	10.44
Hrs. of Study before Criterion Test A	43.82	14.37	34.42	54.48	74.53	94.58
WPM on Criterion Test B Sentences	9.00	0.0	0.0	6.91	15.30	23.69
Hrs. of Study before Criterion Test B	287.32	0.0	60.76	142.48	224.20	305.92

Ted C.	Scores	-2 S.D.'s	-1 S.D.	Mean	+1 S.D.	+2 S.D.'s
Age	45.00	7.39	21.03	34.67	48.31	61.95
Intelligence	139.00	114.84	124.31	133.78	143.25	152.72
Auditory Selection Test	38.00	28.20	32.00	35.80	39.60	43.40
Number of Units per Day	0.81	0.27	0.58	0.89	1.20	1.51
WPM on Criterion Test A Sentences	2.00	0.0	0.66	3.92	7.18	10.44
Hrs. of Study before Criterion Test A	62.33	14.37	34.42	54.48	74.53	94.58
WPM on Criterion Test B Sentences	1.00	0.0	0.0	6.91	15.30	23.69
Hrs. of Study before Criterion Test B	85.33	0.0	60.76	142.48	224.20	305.92

V. ADDITIONAL FINDINGS

Several classes of information were accumulated during the course of this evaluation which did not lend themselves to statistical analysis but nevertheless bear summary. These include a) findings from follow-up telephone interviews, b) findings from home visit interviews, c) findings related to equipment functioning and maintenance, as well as operational ease, d) findings related to the Stereotoner audible outputs, e) findings related to the location of trainees, the deployment of training and the deployment of devices and materials, and f) findings related to a special analysis of speed reading with the Stereotoner.

Telephone Interviews

Uniformly, the trainees were willing to share their thoughts with us at the time of telephone interview, one month after formal training. For the majority of trainees the findings were that:

- o Formal training had been worthwhile, and the trainees were favorably impressed with the helpfulness of the instructor and with the systematic, incremental design of the training materials. They were generally not enthusiastic about having to travel to the Training Centers in order to receive training. They felt that the length of training each day led to fatigue and decreased performance, but they seemed to feel that it was probably necessary, given the limited time before they had to leave the Training Center.
- o Most admitted to a sharp fall off, almost an "escape," from study following their return home. Virtually all expressed "good intentions" but many found excuses (thus, one person found that the presence of others in the home prevented practice, while another person claimed that he became stuck without someone else in the home). Most stated that

they were utilizing the basic Instructional Manual for review purposes prior to beginning the Home Study Manual.

Home Visit Interviews

AIR staff were generally welcomed by the trainees and suitable arrangements had been made for testing (Criterion Test B) and for interview. Only in a few cases were the home visits difficult to accomplish. In one instance, this was a result of difficult scheduling problems related to school and employment; in another case, it was due to a forgotten appointment, and in several cases it was due to an apparent wish of the trainee to avoid being discovered as a non-reader with the concomitant risk of having to turn in the Stereotoner equipment.

At the time of the home visit, for the majority of the trainees, the findings were that:

- The formal training had been as helpful as could be expected, while the home study materials were interesting and informative but relatively hard to master. Most had been in touch again with their instructor for one reason or another and found this access to be reassuring.
- Most of the trainees adopted a home study pattern that was less disciplined than had been recommended, and the reasons given were sometimes weak and sometimes compelling. Most had experimented with reading mail and their own typing and found this to be quite important in meeting their personal needs. When they expressed difficulty in reading other types of materials, it was generally evident that they also had not retained or developed effective techniques for setting magnification or brightness, or utilizing appropriate search procedures to find essential information on a page.

- In the face of reading speeds that still tended to be slow (though roughly double the speeds that were demonstrated at the end of formal training) a surprising number of trainees felt that they were capable of demonstrating the Stereotoner to others, and some felt capable of teaching it. Most planned to continue practicing and thought their speeds would continue to increase, though all felt that a plateau would be reached short of their idealized goals. Anyone who had moved away from a zero reading speed seemed proud that (s)he had been able to do so.

Equipment Functioning

Information was gathered informally from a variety of sources (conference calls, instructor logs, telephone followups, post cards, and home visits) concerning the functioning of the equipment.

Failures and Maintenance: Failures of equipment were encountered both at the Training Centers and in the homes. While these tended to be infrequent, they clearly tended to fall in several categories:

a) loss of power and loss of battery caps,
b) jamming or stripping of set screws,
c) loss of particular tones in the output, or faulty sounding,
d) friction or binding of the rollers in the camera and the tracking aid, and
e) shift or sliding of the magnetic strip on the tracking aid.

Of these, the battery problem proved to be the most recurring and frustrating.

Insofar as AIR is aware, these problems respectively derived from:

a) swollen and/or dead batteries - in part due to incomplete information about charging batteries from the battery manufacturer, later corrected through a special bulletin sent by AIR to all trainees,

b) overtightening of screws

c) breaks in the cable or malfunction in the electronics

d) dirt and/or the choice of materials used for the roller

e) faulty adhesive backing

Servicing of all equipment problems by Mauch Laboratories was prompt and courteous. Where obvious engineering changes could be made they were, including improved batteries, cables, rollers, and adhesive. Again, the overall need for maintenance appears to be infrequent.

Operational ease: The overwhelming majority of complaints about operational difficulties throughout the evaluation was in respect to tracking. The persistence of this problem, and the Mauch Laboratories' efforts to overcome them, can be recognized by the variety of complaints and the number of corrective adaptations attempted. Not necessarily chronologically, these are presented in list form for clarity.

	Complaint	Attempted Solution
Tracking	Skewing of the tracking aid	Magnetic strip affixed to provide stability when used with metal undersheet
	Drift of camera from tracking aid	Wire clip affixed to camera, then clamped over tracking aid
	Lack of smooth roll on camera	Improved roller material suggested
	Non-linear drift in freehand use	Wider roller designed
	Lack of tracking aid stability on text material	Design of special purpose tracking aid
Stereotoner	Camera "top-heavy" and unable to stand alone at the spot where reading stopped.	Design of larger base and roller
	Cable would not fold properly	Pre-bent cable supplied that would self-fold

It should be pointed out that the complaints indicated above were not the only ones but rather were those voiced frequently enough to appear to have merit. (Problems associated with the colineator and the magnetic coupler led most instructors to use it sparingly, if at all.) While the attempted solutions were welcomed, and the Mauch Laboratories was earnest in attempting them, it nevertheless remains true that stable, straight line tracking with the camera in its present vertical orientation remains a problem for efficient, easy reading. The time lost in line-to-line changing and alignment remains appreciable. A suggestion for a horizontal "flat car" into which the camera could be seated has come from one instructor and may have merit. Similarly, the forced pace device for building reading speed shows promise of providing good camera stability.

Stereotoner Audible Outputs

Trainees generally found the tones to be pleasant in nature, some even giving the tones a nickname. For most candidates the tones were within the range of their "good" hearing, and where acuity was diminished in the highs, as was sometimes the case, this presumably could be corrected by increasing the volume on the higher five tones. However, in cases where the hearing loss was restricted to given frequencies within the set of five, then amplification to hear one or two tones would lead to some degree of over-amplification on the remaining tones. The extent to which this presents a serious problem is difficult to say. Nevertheless, it cannot be discounted at theoretical levels, since selective hearing loss would seem to have a detrimental effect, just as would a malfunctioning sensor in the camera.

Because trainees complained of tiring through the day and not being able to "hear" the code as well, an attempt was made to determine whether the volume of the tones or the staccato quality of the tones was causing auditory fatigue. A search of the literature failed to answer the question satisfactorily, but work reported in Harris (1969) seemed provocative.*

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*Ewing and Littler, 1969; Reger and Lierle, 1969; Hood, 1969; Luscher and Zwislocki, 1969.

With the cooperation of Dr. William De l'Aune, research psychologist at the West Haven VA Hospital and Dr. John Watson, audiologist at the Palo Alto VA Hospital, the possibility of auditory fatigue was checked out. Auditory spectral analyses by De l'Aune and interpretations suggested by Watson led to the conclusion that auditory fatigue is not nearly as likely as mental fatigue from tension and concentration.

Notwithstanding the above, which supports the tones selected and the means by which they are presented, it is evident that they represent a difficult code to learn. The continued difficulties in differentiating certain numerals, even by the instructors, bears testimony to this fact. Such lower case letters as a, e, o, and s proved frustrating as well.

Deployment Considerations

Quite apart from the merits of an ink print reading device, the training methods, or the training materials, are the questions of a) diffusion of information about the device and the available training, b) physical accessibility of the training to potential trainees, and c) a marketing and distribution system to handle the flow of goods and services. In the case of this study, all these factors were apparent as potential weak points that might prevent effective deployment of the system, even if it proved quite beneficial. Resolution of these weak points was not a contractual responsibility for an impartial evaluator.

Diffusion of information: Throughout the study, diffusion of information about the Stereotoner within the VA was both slow and apparently ineffective. Although some 4,000 totally blind veterans are thought to exist, according to one informed VA source, there was a continuing difficulty in locating and recruiting candidates for training at all three centers and most noticeably in the West Haven service area.

Similarly, there was little apparent publicity generated in non-veteran circles by Mauch Laboratories, who are admittedly focussed on engineering problems. It is safe to assume that there are many thousands of blind persons who are aware of such devices as the Optacon but are unaware of the Stereotoner. Thus, persons who may be apt users might remain uninformed unless effective information dissemination is accomplished.

Physical accessibility of training: With respect to the location of training, it seemed frequently to be a bone of contention that potential trainees (both veteran and non-veteran) had to leave their homes, families and jobs to receive the training. In the case of the non-veterans and, to a lesser extent the veterans, this proved financially burdensome or otherwise added complications to an already complicated life.

It would seem obvious that a way to minimize this problem is to "take the training to the trainee." This does not necessarily imply that center instructors should be constantly on the go, living out of suitcases. Rather, it argues for the establishment of a training program for instructors, much as already exists for orientation and mobility specialists, leading to a network of qualified instructors who could be engaged by the VA, by state agencies, or by individual blind persons on personal services contracts.

Marketing and distribution: To the extent that the instructional materials and tests developed for the Stereotoner represent a comprehensive, multi-part package, it is obvious that arrangements should be made to make them generally available beyond the life of the evaluation contract. Present priorities within the VA make it unlikely that this will be a function they would assume once the research has been concluded.

In arriving at the decision of who should be asked to assume this responsibility, it seems preferable that such an organization have a non-profit rather than profit motive, be widely known and respected by persons in the blind community, and be appropriately equipped (recording facilities, mailing facilities) to handle reproduction and distribution functions, as well as potential direct testing and teaching. The Hadley School, for one, would seem to hold such qualifications.

Special Analysis of Speed Reading

It came to the attention of AIR staff that a blind individual had attained a considerable level of skill in the use of the Visotoner following a brief period of training at the VA center in Palo Alto. Since the Visotoner was the monaural predecessor to the Stereotoner, it was appropriate to investigate his performance with the newer device.

Roughly a year after an initial visit by VA staff had established that this person was capable of reading rapidly with the Stereotoner, AIR consulted with the individual in an effort to better understand the techniques by which he accomplished his high speeds. To provide a basis for this investigation, a series of paragraphs was developed which altered the ink print in ways which might reveal the importance of different "cueing" components in typed material. These paragraphs were each coherent and meaningful, and included:

1. a standard, non-degraded paragraph read aloud (to establish a reference point)
2. a standard, non-degraded paragraph read silently
3. a Xeroxed paragraph, having degraded print quality
4. a paragraph with all ascenders eliminated
5. a paragraph with all descenders eliminated
6. a paragraph with both ascenders and decenders eliminated
7. a paragraph with all suffixes or other possibly superfluous parts of words left out to simulate scanning
8. a paragraph in all upper case letters
9. a paragraph in which tracking was done for the consultant at his approximate rate.
10. a table of contents involving two type styles, numbers and open spacing between headings and page numbers.

The consultant's reading speed with the Stereotoner was on the order of 85 to 90 WPM on "straight copy," and appeared to suffer most on paragraphs 4, 6, 7, and 9.

By close observation of the kinds of problems encountered and subsequent probes to find out "what was wrong," it was possible to come to agreement that the absence of ascenders and expected words lengths radically altered the perimeter shape of the words, causing them to have a wholly different sound pattern. Second, it became evident that the relative density or openness within words, that is, the amounts of concurrent tones being sounded, was helpful information. Third, word length was established at least as much kinesthetically as aurally. Fourth, major chunks or groups of words were being deduced from context, often after the camera had gone by as many as 5 or 6 words and was already on the next line of type.

In developing this skill (which, incidentally, was equally well demonstrated with the Optacon), the consultant stated that after first learning how to identify letters and words he deliberately shifted to an emphasis on speed. Initially he concentrated on the movement of the camera at a very rapid rate, even though it delivered no meaningful information. Eventually, "familiar" word patterns began to emerge. This brute force principle, coupled with a high intellectual capacity, a desire to excell, and facility with the use of verbal context, could lead to a number of practical ramifications for future trainees and instructors. At the very least, the investigation clearly establishes that for some persons audible codes are at least as readily utilized as are tactile ones.

VI. DISCUSSIONS AND CONCLUSIONS

In the paragraphs which follow we will recap selected findings, offer interpretive discussions, and draw tentative conclusions. Three categories are used to organize this discussion. They are 1) the attainment of reading performance skills, 2) instructional process, and 3) logistics and deployment.

Attainment of reading performance skills

Recap: Reading skills attained with the Stereotoner by adults were modest. The initial period of formal training, consisting of some 54 hours on the average, led to a wide range of reading speeds in sentence-type material. The average rate was 4 WPM and the fastest was 13 WPM. Following formal training, individuals had the opportunity to study on their own at home for an average of 87 additional hours. Their reading rates increased to an average of 7 WPM, and the fastest was 34 WPM. It was observed by AIR staff that one blind person (not trained in this study) had achieved reading rates of 85 to 90 WPM with the Stereotoner. This suggests that the study averages might be viewed as being conservative, with most trainees being still below their potential.

Accuracy in reading numbers averaged about 76% and isolated words averaged about 81% at the end of formal training. After several weeks, twenty trainees functioned within the 90-100% accuracy level. Accuracy in reading both numbers and words fell off following formal study, averaging 55% and 66% respectively. It was quite clear that numbers were more difficult to recognize than were words.

The variety of reading materials which trainees were able to cope with was rather limited, even at the time of the final criterion test. It was evident, however, that whereas unusual layouts, type faces, and numbers were not effectively mastered, many trainees felt that they *had* achieved an acceptable amount of proficiency in reading their own mail and in proofing their own typing.

Discussion: The interpretation of whether attained reading speeds are "adequate" or not is inextricably bound up in several considerations and questions. First, can the trainee read ink print materials more independently than (s)he did before? Clearly, for most of the trainees, all of whom started at zero, the answer is yes. Many were quite proud of their modest accomplishments.

Second, did the trainee feel that his or her potential (peak) performance with the device had been reached? For most trainees, the answer is no. Many felt that a particular complication yet to be mastered (e.g., tracking) had kept them from reaching their maximum performance level.

Third, what investment of effort has it taken to get to this point and is there reason to believe that further effort will be productive? The absolute numbers of clock hours that the trainees devoted to study were small, averaging about 18 hours a week in formal training and 4 to 5 hours a week in home study. Few persons have the aptitude to become proficient in a foreign language, let alone a difficult auditory code, in such a limited time frame. The real issue, then, becomes one of patience and persistence, and it was evident from the dropouts that a number of persons either lacked these qualities or had priorities in their lives which mitigated against an adequate study commitment. It is a matter of some interest, then, that one person had reached 85 to 90 WPM on the Stereotoner with disciplined practice. An analysis of his reading technique established that he depended heavily on detecting a) the perimeter shape of the word, b) the audible density of letters in the word, and c) contextual meaning within sentences.

Fourth, is there a way of identifying those persons who are most apt to benefit from Stereotoner training? Correlations and stepwise regression analyses indicate that use of AIR's specially developed Auditory Selection Test can be of considerable help in predicting Stereotoner performance. In so far as background characteristics are concerned, it is evident that intellectually able younger persons, having no additional physical or emotional problems, and who are willing to undertake a daily routine of study, are the persons most likely to benefit.

Fifth, is there evidence to suggest that an auditory output device such as the Stereotoner is more or less effective than a tactile output device such as the Optacon? The study was not designed to answer this question and no firm answer can be given based on the hard data collected. Nevertheless, some inferences can be made on observational grounds. As indicated previously, a consultant to the project performed outstandingly with both types of devices. At the other extreme, the candidate level, it seemed that in instances where candidates were exposed to both types of devices some candidates would choose one and some the other. Obviously, relative success on the aptitude tests for the devices entered into the decision, as it should. There also appeared to be a slight disposition of musically inclined persons to opt for the Stereotoner, while those more concerned with ease of manipulation and tracking chose the Optacon. Attained speeds were not markedly different as a consequence of this choice insofar as we can tell from information given us. Finally, the pilot investigation with one eleven-year-old who was taught to use the Stereotoner suggests that it, like the Optacon, may be feasibly introduced in school settings.

Conclusions: The Stereotoner seems to be a difficult device to learn for many blind persons but nevertheless may be worthwhile for some of them. The AST aptitudes, interests, and commitment of individuals should be given serious consideration when recommending for or against training with the Stereotoner.

Reasonable and modest expectations of performance should be established for all trainees. More conservative expectancy levels should be set for older trainees, especially those who may have additional physical or emotional problems.

Instructors should consciously attempt to emphasize whole word recognition rather than letter-by-letter reading. Smooth, steady forward tracking and an emphasis on contextual meaning should be encouraged.

Instructional Process

Recap: Trainees were drawn from both veteran and non-veteran constituencies. They were accepted if they appeared 1) to have potential, 2) to be willing to relocate for two or three weeks to the training center, and 3) to agree to further self-monitored study at home.

At the training centers, they were taught by qualified blind instructors. Daily "doses" of formal training were concentrated and a number of trainees became less efficient in study in the latter part of the day. Recommended home study appeared to be rather laxly followed, and reading skills were affected accordingly. Some persons' skills decreased.

When interviewed concerning their basic or formal training, the trainees (and their instructors) thought that the materials had been well designed and helpful. Trainees also consistently felt that their instructors had been attentive and helpful.

When interviewed at home some months later, the trainees thought that the Home Study Manual had been quite revealing in that they now realized that there were many difficulties inherent in reading diverse ink print materials. It was also felt that, for the most part, these difficulties could be overcome in applied areas of particular interest to them. Loss of continued interaction with qualified instructors was felt to be a factor which led to poor study habits and loss of momentum. Although the tapes accompanying the Home Study Manual were thought to be helpful, the trainees generally felt that the help they received from family or friends was not a satisfactory substitution for the insights and counsel they previously had available from their instructors. Indeed, during home visits it was evident that family members tended not to "interfere" and, lacking the Reflex Viewer (for use by sighted instructors), were limited in their helping ability.

Discussion: There is little doubt that the teaching skills of the instructors were valued by the trainees and the instructional manuals were thought to be appropriate.

As to the scheduling of study, there was evidence to suggest that both concentrated study at the centers and unsupervised study at home left something to be desired. Fatigue became a factor that worked disadvantageously in formal training and laxity coupled with competing priorities became factors that were counterproductive in home study. The need to maximize the limited opportunity for trainee/instructor interaction led to the development of a series of pre-training tapes to acquaint potential trainees with the nature and sound of the Stereotoner. However, these tapes were not available early enough within the study to be used by the participants in any consistent way, and their value is therefore unknown.

Conclusions: It would seem that the instructional manuals developed by AIR are adequate for adults. Similarly, blind instructors who know the Stereotoner code and can convey Stereotoner techniques clearly, can do a satisfactory job of teaching. Only minimal evidence is available, but there is some reason to believe that sighted instructors could also teach the Stereotoner. However, sighted instructors should have full cognizance of the code even if they are not "readers" with it in an auditory sense. This presumes, of course, that they avail themselves of the Reflex Viewer, which was specifically designed to permit direct observation of the letter being read.

Scheduling of instruction would probably be better if it were on the order of two to three hours per day but extended over quite a lot longer time frame. This would give trainees an opportunity to develop steadily, but at their own pace, secure in the knowledge that an instructor was aware of their problems and their progress.

Although instructional time blocks might not be lengthened at training centers due to administrative requirements or personal options, it would seem advisable to work out a plan assuring that instructional help will also be available near the trainee's home, perhaps through personal services contracts with local educators of the visually impaired or with local service agencies.

Logistics and Deployment

Recap: Difficulties and delays were encountered within the VA in locating candidates for training. When candidates were eventually found and tested there were some who had potential but declined to participate. Some candidates were reluctant to travel to another part of the country to receive training, others were apparently unwilling to break into their jobs or otherwise disrupt their home situation to the extent of being away for an extended period.

The Stereotoner equipment operated reliably for the most part, with principal difficulties being encountered in terms of battery failure. Mauch Laboratories' service was prompt and efficient, and steps were taken to correct the problems.

Functional performance was most affected by difficulties of tracking with sufficient accuracy to ensure faithful reproduction of the letter and number sounds as one traversed lines of print, and in the discontinuity encountered during line changes when the horizontal alignment of the tracking aid was disturbed.

Relatively little public awareness has been generated with respect to the Stereotoner, far less than has been true with the Optacon. Certainly, there is no general awareness among public school teachers about the Stereotoner, and they will probably be cautious in embracing it based on a trial with only one student.

Discussion: It is apparent that there is much more to the meeting of blind persons' needs than simply creating devices and offering training at remote locations. People have various priorities, and developing personal independence in reading via the Stereotoner is only one of them. For some it is quite important, for others the necessary training represents too much of an investment in their time, energy, or disruption in their personal lives.

Once entered into training, the participants can become encouraged or discouraged by how quickly or how slowly they can operate the equipment in the prescribed manner, by malfunctions, and by their ability to get prompt servicing. The Stereotoner rated high on the latter two points, but lower on the first point.

Conclusions: Administrators of service programs for veterans or non-veterans should show flexibility in providing services when and where the trainee requests it; in the recognition they give to appropriate candidate selection; and in their support of the instructional program.

To the extent that decisions are reached to further promote and offer Stereotoner training, it is apparent that more instructors will have to be prepared, more publicity given out, and provisions made for circulation of the tests, manuals, tapes, and other associated materials. The machinery for accomplishing these tasks is not yet established, though they could well be undertaken by a well known, non-profit agency already serving the blind community.

VII. Recommendations

The long history of research and development within the field of ink print reading devices for the blind has made it abundantly clear that progress is evolutionary rather than sudden. The field has yet to develop an ideal, inexpensive and portable device (either auditory or tactile) with a readily learnable code that permits truly flexible, rapid and independent access to ink print. In short, we have not yet come close to substituting for the human eye as a means for reading ink print. Lest prior research and development appear to be a losing cause, it should be noted that in each of the foregoing critical areas significant progress has been made. For some blind persons major changes in life style and life opportunity have already been achieved through one or another of the present array of reading devices and training procedures.

In AIR's previous study, using a tactile device (the Optacon) with school-age blind children, we found a wide range of a) developed ink print reading performance, b) interest and effort expended in learning to use the device, and c) readiness to utilize it in their studies. Similarly, in the present study, using an auditory device (the Stereotoner) with an (essentially) adult population, we found a wide range of a) developed ink print reading performance, b) interest and persistence in learning to use the device, and c) readiness to apply it to their work and other daily living reading opportunities. Given the state-of-the-art and the limitations of various devices developed to date, it is not possible to endorse them without qualification. We therefore believe that research and development should continue. It will probably be most productive if it proceeds along the dimensions presently most frustrating and limiting to the trainees (and instructors) involved; for they, of course, are the ones whose needs are to be satisfied.

With the above in mind, a general recommendation can be made. Also, based on the findings of this study, a number of specific recommendations can be made.

General Recommendation

- Further research and development of ink print reading devices for the blind should be encouraged. Not only is there a general awareness of personal, social, or economic benefits to be gained by the independent reading of ink print but this study has produced preliminary evidence that in some applications (reading mail and proofing typing) present technology has been quite helpful to some individuals.

  The difficulty of learning both the auditory code and the precise equipment manipulation involved would seem to indicate that the Stereotoner is only appropriate for some persons. What is clearly needed is research and development aimed at simplification of these processes, thereby increasing the numbers of blind persons who could successfully undertake training. Current work in spelled speech and synthetic speech outputs may go a long way toward reaching this goal.

Specific Recommendations

- Blind individuals who have an interest in learning to read ink print should be given a choice as to which of several devices they wish to use. The Stereotoner can be used successfully by some and therefore should be offered as one alternative. Accordingly, it should be given wider publicity within the Veterans Administration and particularly in the public sector.
- Careful matching of candidates to devices should be undertaken to minimize the amount of disillusionment and defeat that follows from being underprepared either in terms of aptitudes or commitment to study. The Auditory Selection Test can help to identify candidates with good potential for the Stereotoner, and should be administered in the field prior to an individual's arrival at the training center.

- To the extent possible, administrative steps should be taken to ease the access to training of blind individuals through decentralizing of instruction. To the extent that this is not possible, steps should be taken to 1) provide trainees with relevant pretraining or orientation materials, where these exist; 2) establish training schedules well within the trainees' fatigue limits; and 3) arrange for direct periodic professional assistance on a follow-up basis at the time trainees undertake further home study.

- The basic complement of equipment for Stereotoner training (T) and usage (U) should include the following:

  Stereotoner with wide carriage, prebent cable, and improved battery. (T,U)

  Basic magnetic tracking aid and book type magnetic tracking aid. (T,U)

  Reflex Viewer (T)

  Reading Pacer (T)

  For facilitating beginning tracking a stabilizing horizontal "flatcar" for the probe might be a welcome engineering addition. A double T-square type guide might also simplify line changing in initial training.

  Any participants in this study who learned how to use the Stereotoner should be provided with the (U) items to encourage their further skill development.

- The empathy, patience and professional expertise of the blind instructors in this study should be emulated in such other training stations as are established. The instructional materials as developed by the American Institutes for Research, and revised following field testing, should be the principal resource used, augmented by materials of the trainee's own choosing.

Following a basic introduction to the alphabet, instructional techniques should emphasize the teaching of rapid undirectional scanning while listening for the characteristics of words (perimeter shape, density, and length), then coupling this information with context to identify words and phrases.

- While the Stereotoner is not the most expensive ink print reading device on the market, it and its associated equipment represent a sizeable investment for the individual. Since dropout rates may continue to be high (until easier reading systems become available), it would seem appropriate to offer a rent-to-own plan or otherwise soften the financial burdens placed on prospective trainees.
- Further evaluation of the Stereotoner should be undertaken in public school contexts, and with younger children, in order to substantiate its potential for that group. Existing age-relevant instructional materials could be adapted for this purpose.

REFERENCES

Abma, J. S., Huffman, L. L., Mason, L. J., & Coffey, J. L. The further development and evaluation of aural reading devices for the blind. Columbus, Ohio: Battelle Memorial Institute, June 1960.

Coffey, J. F., Hull, H. E., Metcalfe, D. M., Mason, L. J. The further development and evaluation of aural reading devices for the blind. Columbus, Ohio: Battelle Memorial Institute, June 1961.

Ewing, A. W. G., & Littler, T. S. Auditory fatigue and adaptation. In J. D. Harris (Ed.), Forty germinal papers in human hearing. Groton, Conn.: Journal of Auditory Research, 1969.

Freiberger, H. Reading machines for the blind, the Veterans Administration, and the non-veteran blind. In L. L. Clark (Ed.), Research Bulletin Number 24. New York: The American Foundation for the Blind, March 1972.

Harris, J. D (Ed.). Forty germinal papers in human hearing. Groton, Conn.: Journal of Auditory Research, 1969.

Hood, J. D. Studies in auditory fatigue and adaptation. In J. D. Harris (Ed.), Forty germinal papers in human hearing. Groton, Conn.: Journal of Auditory Research, 1969.

Linvill, J. G. Research and development of tactile facsimile reading aid for the blind, The Optacon. Final report, Project No. 142112. Stanford, Calif.: Stanford Electronics Laboratories, Stanford University, March 1973. (Grant No. OEG-0-8-071112-2995)

Lüscher, E., & Zwislocki, J. The decay of sensation and the remainder of adaptation after short pure-tone impulses on the ear. In J. D. Harris (Ed.), Forty germinal papers in human hearing. Groton, Conn.: Journal of Auditory Research, 1969.

Murphy, E. F. Evaluation of certain reading aids for the blind. In M. Guttman (Ed.), Evaluation of sensory aids for the visually handicapped. Washington, D.C.: National Academy of Sciences, 1972.

Reger, S. N., & Lierle, D. M. Changes in auditory acuity produced by low and medium intensity level exposures. In J. D. Harris (Ed.), Forty germinal papers in human hearing. Groton, Conn.: Journal of Auditory Research, 1969.

Smith, G. C., & Mauch, H. A. Summary report on the development of a reading machine for the blind. Dayton, Ohio: Mauch Laboratories, Inc., 1975. (Contract No. V101(134)P-68)

Weisgerber, R. A., Everett, B. E., Rodabaugh, B. J., Shanner, W. M., & Crawford, J. J. Educational evaluation of the Optacon (Optical-to-Tactile Converter) as a reading aid to blind elementary and secondary students. Final report, Project 34500. Palo Alto, Calif.: American Institutes for Research, 1974. (Contract No. OEC-0-72-5180)

APPENDIX A-1

EXCERPTS FROM INSTRUCTIONAL MANUAL

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(Revised Instructional Units)

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UNIT 2 Letters ATRE, atre
UNIT 3 Letters IHOS, ihos
UNIT 4 Letters DLUN, dlun
UNIT 5 Letters CGMF, cgmf
UNIT 6 Letters WPKQ, wpkq
UNIT 7 Letters YBV, ybv
UNIT 8 Letters JXZ, jxz
UNIT 9 Numerals
UNIT 10 Building Reading Speed
UNIT 11 Additional Typefaces
UNIT 12 Encountering New Formats
UNIT 13 Equipment Operation and Utilization
UNIT 14 Remediation

0

----	/	/	\	/	\	\	/	\	/	/	--
----	7	/	/	7	/	7	7	7	/	7	--
----	/	V	/	/	V	V	/	V	/	V	--
----	X	V	X	V	V	X	V	X	X	V	--
----	M	V	V	M	M	V	M	V	V	M	--
----	0	0	0	0	0	0	0	0	0	0	--
----	o	0	0	o	0	o	o	0	o	0	--
----	C	0	C	C	0	C	0	C	C	C	--
----	0	D	D	0	0	D	D	0	0	D	--
----	0	8	0	8	8	0	0	8	0	8	--
----	a	o	a	a	o	o	a	o	a	a	--
----	o	p	o	p	p	p	o	p	o	o	--
----	p	b	p	p	b	b	p	b	p	b	--
----	d	b	b	d	d	b	d	b	b	d	--

■

Unit 1 Lesson 2 Adult Level
Tone Practice

o

---- 1. Y Y y y Y y B B b b B b V V v v V v --

---- 2. V b y B y v b V y B V v Y b B Y --

---- 3. why Buy big Yes yet --

---- 4. verb Yarn Vote Busy very --

---- 5. yell brown visit Brave --

---- 6. Year verse behave Before --

---- 7. because balloon Yesterday --

---- 8. You have nearly finished your basic --

---- 9. lessons about the letters of the alphabet. --

---- 10. You probably are not yet able to read --

---- 11. books from the library. But you should --

---- 12. try to improve your ability by --

---- 13. reading something every day. --

■

Unit 7 Lesson 3 Adult Level
Letters YBV, ybv mixed

o

---- 1. Here are some letter patterns that often start words.
---- 2. The letter patterns are repeated three times, followed
---- 3. by four words that use the pattern. Learn to recognize
---- 4. these patterns so that you can read whole words quickly
---- 5. instead of letter by letter.

sh	sh	sh	shoe	shut	shove	shape
th	th	th	this	that	there	those
st	st	st	stop	store	steam	state
sp	sp	sp	spin	span	spun	spool
tr	tr	tr	trip	trap	trot	treat
ti	ti	ti	tie	tilt	tired	tight
ch	ch	ch	chop	chin	chair	chest
wh	wh	wh	who	what	where	which
dr	dr	dr	drip	drop	drive	drove
gr	gr	gr	grab	grip	grand	great
pl	pl	pl	plan	play	place	plant
ri	ri	ri	ripe	ring	rinse	riddle
bl	bl	bl	blow	blew	black	blast
cl	cl	cl	clip	clap	clear	clean
sl	sl	sl	slip	slap	slide	slant
fl	fl	fl	flag	flop	flame	float
gl	gl	gl	glue	glove	glass	glide

This page has some simple arithmetic problems. If you practice reading this page, it will help you learn to identify numbers. Decide whether each problem is right or wrong.

2 + 2 = 2 ... 1 + 0 = 1 ... 2 + 1 = 3 --
3 + 1 = 4 ... 2 + 2 = 4 ... 1 + 3 = 4 --
2 - 1 = 1 ... 4 - 2 = 2 ... 3 - 3 = 0 --
6 - 1 = 5 ... 9 - 2 = 7 ... 8 - 4 = 4 --
7 + 1 = 8 ... 3 + 6 = 8 ... 4 - 3 = 1 --
6 + 4 = 10 ... 9 + 9 = 16 ... 12 - 4 = 8 --
24 - 10 = 12 ... 7 + 11 = 18 ... 20 - 5 = 10 --

Unit 10 Lesson 2 Adult Level
Simple Arithmetic

In this lesson you will learn letters printed in italic typeface. Italic letters slant to the right. They are often used to emphasize important words or for quotations. First, you will read numbers, then all the letters of the italic alphabet in capitals and small letters. (Each symbol is presented three times.) Next, you will read some common words. Last of all, there are some sentences from Bartlett's Familiar Quotations. At the very bottom of the page are printed letters in the typeface you first learned so that you can compare them with the italic letters.

0 0 0 1 1 1 2 2 2 3 3 3 4 4 4 5 5 5 6 6 6 7 7 7 8 8 8 9 9 9
A A A B B B C C C D D D E E E F F F G G G H H H I I I
J J J K K K L L L M M M N N N O O O P P P Q Q Q R R R
S S S T T T U U U V V V W W W X X X Y Y Y Z Z Z

a a a b b b c c c d d d e e e f f f g g g h h h i i i
j j j k k k l l l m m m n n n o o o p p p q q q r r r
s s s t t t u u u v v v w w w x x x y y y z z z

The of and to in that Was they From One all can Your
what Said each About how then she just Many like People over
long After most Know Six square place well such Lazy

The only thing we have to fear is fear itself. (Franklin D. Roosevelt)
Common sense is not so common. (Voltaire)
All animals are equal, but some animals are more equal than others.
(George Orwell)
You can't hold a man down without staying down with him.
(Booker T. Washington)
I never met a man I didn't like. (Will Rogers)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

Unit 11   Lesson 2   Adult Level
Italic Type

Below is the table of contents from one issue of Talking Book Topics. This magazine is published bimonthly for the Library of Congress by the American Foundation for the Blind, and distributed free to blind persons. On which page in the Cassette Books section would you find Adult Nonfiction titles?

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July-August 1972

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  Children's Fiction 157
Cassette Books
  Adult Nonfiction 158
  Adult Fiction 158

Here is a short poem in free verse form.

I have a friend
who's always there
and who knows
all my secrets.
My friend
is
me.

UNUSUAL APPLICATIONS

1. You may want to use your Stereotoner to tell whether lights are turned on or off in the room or on equipment you are using. Turn the reverse switch on, set the magnification to position 1, and turn the probe lamp brightness down by going clockwise. Then aim the aperture of the camera in the direction of the room lights or equipment lights you wish to check.

2. You may want to read printing located under glass or plastic, such as a meter. This is possible only if the glass or plastic is clear and no thicker than about a quarter inch. You will have to turn the probe lamp brighter to do this.

3. You may want to read print on a recessed surface, such as a tape cassette. Again, you are limited to a quarter inch of height difference and you will have to brighten the probe lamp.

4. You may want to read print on cans or other round surfaces. If possible, place the can on the table and roll it slowly backward as you hold the probe steady on the upper surface.

5. You may want to check the accuracy of your typing. If you stop to check a word or sentence, roll the paper up a certain number of lines (about 4 to 6 depending on the typewriter), lift the paper bale, place the probe on the platen just above where the keys strike the paper. You can guide along the typed line by the paper bale or by feeling the shape of the platen itself.

You can use Ko-Rec-Type to make your correction. Ko-Rec-Type is a slip of paper that is chalky on one side. The chalky side goes against the page. When struck with the typewriter key that made the error, it whites out or covers the original type so you can retype in that space. The new letter will need to be struck several times to get it dark enough.

Try this exercise now on a typewriter, then have your instructor check on how well you made your correction.

o ____

---- 1. a a a   ᵃ ᵃ ᵃ   ᴜ ᴜ ᴜ   a a a --

---- 2. b b b   ' ' '   ᴅ ᴅ ᴅ   b b b --

---- 3. c c c   ⌐ ⌐ ⌐   ᴗ ᴗ ᴗ   c c c --

---- 4. d d d   ' ' '   ɑ ɑ ɑ   d d d --

---- 5. e e e   ᵒ ᵒ ᵒ   ᴗ ᴗ ᴗ   e e e --

---- 6. f f f   ᶠ ᶠ ᶠ   ı ı ı   f f f --

---- 7. g g g   ɑ ɑ ɑ   ˏ ˏ ˏ   g g g --

---- 8. h h h   ' ' '   n n n   h h h --

---- 9. i i i   ᶤ ᶤ ᶤ   ı ı ı   i i i --

---- 10. j j j   i i i   J J J   j j j --

---- 11. k k k   ᵏ ᵏ ᵏ   ⁿ ⁿ ⁿ   k k k --

---- 12. l l l   ˡ ˡ ˡ   ı ı ı   l l l --

---- 13. m m m   ᵐ ᵐ ᵐ   ııı ııı ııı   m m m --

■

APPENDIX A-2

EXCERPTS FROM HOME STUDY MANUAL

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UNIT A: Personal Affairs

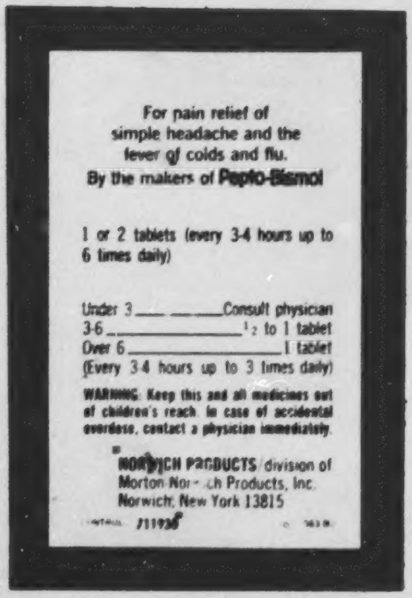
Lesson 10: Details on Labels 26

OUTLINE:

I. Reading a Dosage, Page 26

II. Reading Instructions, Page 26

III. Reading Contents, Page 27



For pain relief of
simple headache and the
fever of colds and flu.
By the makers of Pepto-Bismol

1 or 2 tablets (every 3-4 hours up to 6 times daily)

Under 3 ________ Consult physician
3-6 ________ ½ to 1 tablet
Over 6 ________ 1 tablet
(Every 3-4 hours up to 3 times daily)

WARNING: Keep this and all medicines out of children's reach. In case of accidental overdose, contact a physician immediately.

NORWICH PRODUCTS division of
Morton-Norwich Products, Inc.
Norwich, New York 13815

[illegible] 711936 [illegible]

INSERT **KO·REC·TYPE** TO CORRECT ORIGINALS

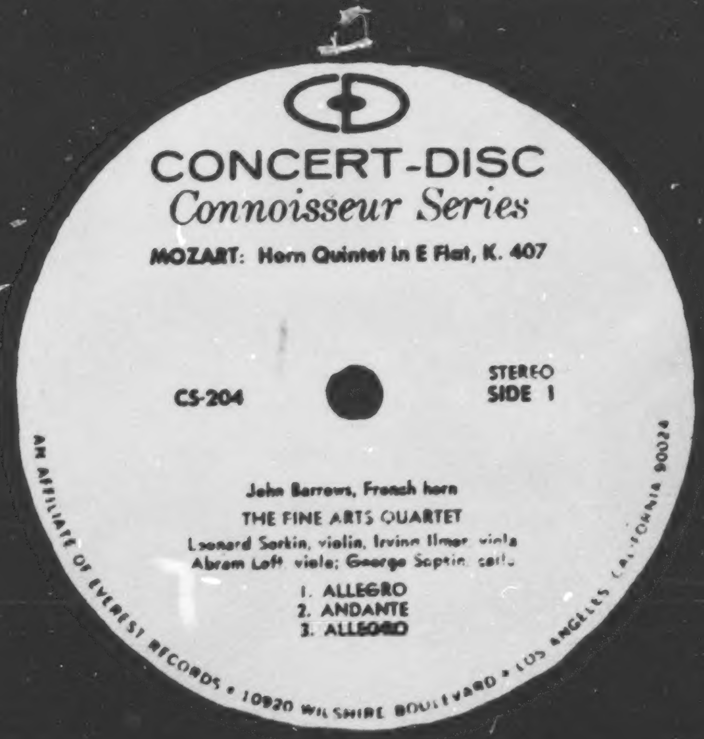
3. Place KO-REC-TYPE® brand correction material directly on original copy error with coated side face down.
4. Retype using exactly the same letters as the error.
5. Remove correction material from your original and each of the carbon copies. Presto – your error has disappeared.
6. Now, type in correct word or letter.

Unit B: Leisure Affairs

Lesson 9: Reading Record and Tape Labels

OUTLINE:

I. Reading a record label, page 50
II. Reading a record album cover, page 51
III. Reading the label from a tape cassette, page 52



CONCERT-DISC
Connoisseur Series

MOZART: Horn Quintet in E Flat, K. 407

CS-204

STEREO
SIDE 1

John Barrows, French horn
THE FINE ARTS QUARTET
Leonard Sorkin, violin, Irving Ilmer, viola
Abram Loft, viola; George Sopkin, cello

1. ALLEGRO
2. ANDANTE
3. ALLEGRO

AN AFFILIATE OF EVEREST RECORDS • 10920 WILSHIRE BOULEVARD • LOS ANGELES, CALIFORNIA 90024

UNIT C: Social Affairs

Lesson 9: Reading a School Calendar

OUTLINE:

I. Reading an Academic Calendar, sample, page 73.

SUMMER SESSIONS

June 25, 1973 - September 14, 1973

June 4	Postmark deadline for returning Registration-by-mail packets
June 18, 19, 20	Alphabetical registration for all students not registered by mail
June 25-29	Field Trip Courses
June 25-Sept. 14	Twelve-Week Special Session
July 2-13	Pre-Summer Session
July 2-Aug. 24	Eight-Week Session
July 16-Aug. 24	Six-Week Session
July 23-Aug. 3	Mid-Summer Session
Aug. 13-24	Late Summer Session
Aug. 21-Aug. 31	Post Summer Session

Note: See Schedule of Classes for (1) deadline dates to add or drop classes and (2) final examination dates.

FALL SESSION

September 17, 1973 - December 14, 1973

June 22	Last day for foreign students to apply for admission
July 21	National testing date for ACT test for all entering day students and evening students who plan to earn a degree
August 20	Last day for out-of-state students to apply for admission
September 17	Instruction begins
October 22	Legal Holiday
October 24	Last day to officially drop a class without penalty
November 22 and 23	Thanksgiving Recess
December 10-14	Final examinations for day and evening students
December 14	End of Fall Quarter
December 17-Jan. 1, 1974	Recess between quarters

WINTER SESSION

January 2, 1974 - March 22, 1974

October 20	National testing date for ACT test for all entering day students and evening students who plan to earn a degree
November 16	Last day for out-of-state students to apply for admission
January 2	Instruction begins
February 5	Last day to officially drop a class without penalty
February 12	Legal Holiday - Lincoln's Birthday
February 18	Legal Holiday - Washington's Birthday
March 18-22	Final examinations for day and evening students
March 22	End of Winter Quarter
March 25 and 26	Recess between quarters

SPRING SESSION

March 27, 1974 - June 14, 1974

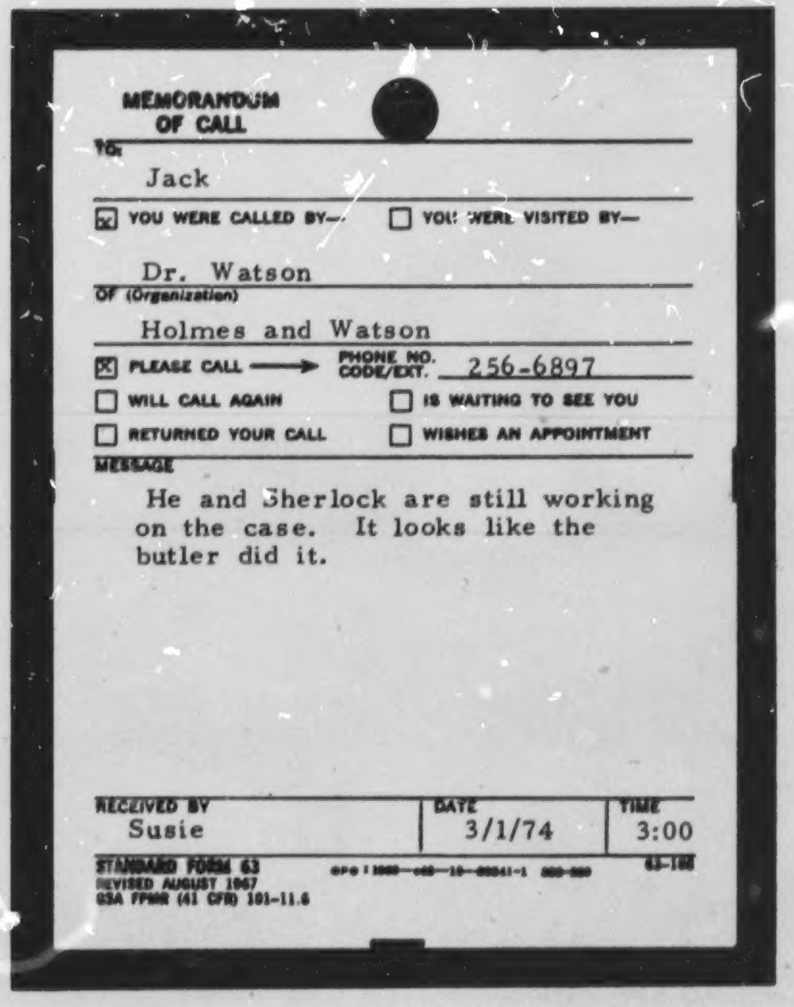
December 8 and February 23	National testing date for ACT test for all entering day students and evening students who plan to earn a degree
February 15	Last day for out-of-state students to apply for admission
March 27	Instruction begins
April 30	Last day to officially drop a class without penalty
May 27	Legal Holiday
June 10-14	Final examinations for day and evening students
June 14	End of Spring Quarter

UNIT D: Business Affairs

Lesson 2: Forms Found in an Office

OUTLINE:

I. Reading a phone message, sample, page 83
II. Reading a routing slip, sample, page 84
III. Business cards, samples, page 84



MEMORANDUM OF CALL

TO: Jack

☒ YOU WERE CALLED BY— ☐ YOU WERE VISITED BY—

Dr. Watson

OF (Organization) Holmes and Watson

☒ PLEASE CALL → PHONE NO. CODE/EXT. 256-6897

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

He and Sherlock are still working on the case. It looks like the butler did it.

RECEIVED BY	DATE	TIME
Susie	3/1/74	3:00

STANDARD FORM 63
REVISED AUGUST 1967
GSA FPMR (41 CFR) 101-11.6
GPO : [illegible]
63-108

APPENDIX B

Criterion Tests A & B (Revised)

The tests which follow are directly drawn from the Criterion Tests used in this study. They have been shortened to make their use feasible in training contexts and to remove redundance across the two forms. Paragraph length timed tests have not been included. The criterion paragraphs were drawn from the Short Form Test of Academic Aptitude (Level 5), (CTB/McGraw-Hill) and are widely available. Part 3 of Criterion Test B has been shortened by the elimination of test items on a) newspaper headlines, b) a catalog price, and c) a book index.

CRITERION TEST - FORM A
ADMINISTRATION INSTRUCTIONS AND SCORE SHEET

Part 1:

(This section of the test is not timed and the only information necessary to be recorded is the correctness of the trainee's response to each item. The instructor should score the test using the list to check all correct answers.)

SAY: Read each word with the Stereotoner and say it out loud after you have read it. This section of the test is not timed so you need not read in a hurry. When you know what each word is just tell me when you have finished reading it. Please begin now.

(When the student completes the word list,)

SAY: Let's stop for a few minutes and rest.

WORD LIST	Incorrect	Corr
1. not		
2. which		
3. she		
4. big		
5. never		
6. yet		
7. omit		
8. open		
9. air		
10. things		
11. society		
12. ordinary		
13. found		
14. queen		
15. asked		
16. fasten		
17. high		
18. magazine		
19. does		
20. usually		
21. perhaps		
22. true		
23. benefit		
24. peaceful		
25. necessary		

Total correct______ x 4 = _______% correct

CRITERION TEST - FORM A

Part 1:

not which she big never yet omit open air things
society ordinary found queen asked fasten high magazine
does usually perhaps true benefit peaceful necessary

Criterion Test - Form A
Administration Instructions (continued)

Part 2:

This part of the test is timed and you should record the time required to read the 10 sentences, then calculate total time when you have finished. Since you will be asking a question after each sentence it will be necessary for you to stop the stopwatch at the end of each sentence after the trainee has finished reading it, and start it again when he or she begins the next sentence. The questions to be asked by the instructor at the end of each sentence are listed beneath the sentences along with blanks for recording whether the responses were correct or incorrect.)

SAY: This section of the test consists of some sentences which I want you to read to yourself. After you have read each sentence I will ask you a simple question about what the sentence said. This section of the test is timed so you should read as rapidly and accurately as you can. Position the Stereotoner on the number in front of the first sentence. Do not begin reading the sentence until I say "begin." You should stop when you have finished the sentence so that I can ask the question. Do not go to the next sentence until I tell you. Do you have any questions?

(After each sentence record the time for that sentence. Then ask the question that goes with the sentence. Record the correctness of the trainee's response and then say:)

SAY: Now move the Stereotoner to the next line and position it over the number of the sentence. Do not begin the sentence until I say "begin."

(At the completion of Part 2, calculate the total time spent reading the sentences in minutes and seconds.)

Criterion Test - Form A

Part 2 (continued)

1. There were 17 people standing in the line.
2. The object that struck the earth weighed over a thousand tons.
3. Food from the refreshment stand is not to be taken to the pool area.
4. Because of bad weather, the company picnic was cancelled.
5. The zoo was named after a former mayor.
6. The bottle was marked, "Do not take internally."
7. He bought a ticket to Chicago, the city nearest to where I live.
8. Steam engines were used for travel in the 1800's.
9. The puppy fell off the front porch, but he wasn't hurt badly.
10. Most dogs are very faithful to their owners.

Criterion Test - Form A
Administration Instructions Continued - Part 2

1. There were 17 people standing in line. ______Tim
   QUESTION: How many people were in the line?
   ANSWER: 17 _____Correct_____Incorrec

2. The object that struck the earth weighed over a thousand tons. ______Tim
   QUESTION: What did the object strike?
   ANSWER: Earth _____Correct_____Incorrec

3. Food from the refreshment stand is not to be taken to the pool area.
   ______Tim
   QUESTION: Where is food not permitted?
   ANSWER: pool area, pool _____Correct_____Incorrec

4. Because of bad weather, the company picnic was cancelled. ______Tim
   QUESTION: Why was the picnic cancelled?
   ANSWER: bad weather _____Correct_____Incorrec

5. The zoo was named after a former mayor. ______Tim
   QUESTION: Who was the zoo named after?
   ANSWER: former mayor, mayor _____Correct_____Incorrec

6. The bottle was marked, "Do not take internally." ______Tim
   QUESTION: What was marked, "Do not take internally."?
   ANSWER: the bottle _____Correct_____Incorrec

7. He bought a ticket to Chicago, the city nearest to where I live. ______Tim
   QUESTION: What city was the ticket to?
   ANSWER: Chicago _____Correct_____Incorrec

8. Steam engines were used for travel in the 1800's. ______Tim
   QUESTION: When were steam engines commonly used?
   ANSWER: 1800's _____Correct_____Incorrec

9. The puppy fell off the front porch, but he wasn't hurt badly. ______Tim
   QUESTION: What fell off the front porch?
   ANSWER: puppy _____Correct_____Incorrec

10. Most dogs are very faithful to their owners. ______Tim
    QUESTION: What pet was the sentence about?
    ANSWER: dogs _____Correct_____Incorrec

CRITERION TEST - FORM B
ADMINISTRATION INSTRUCTIONS AND SCORE SHEET

Part 1:

(This section of the test is not timed and the only information necessary to be recorded is the correctness of the trainee's response to each item. The instructor should score the test using the list to check all correct answers.)

SAY: Read each word with the Stereotoner and say it out loud after you have read it. This section of the test is not timed so you need not read in a hurry. When you know what each word is just tell me when you have finished reading it. Please begin now.

(When the student completes the word list,)

SAY: Let's stop for a few minutes and rest.

WORD LIST	Incorrect	Correct
1. may	_____	_____
2. came	_____	_____
3. heavy	_____	_____
4. next	_____	_____
5. most	_____	_____
6. scatter	_____	_____
7. ideal	_____	_____
8. you	_____	_____
9. who	_____	_____
10. musical	_____	_____
11. leaped	_____	_____
12. now	_____	_____
13. began	_____	_____
14. ways	_____	_____
15. become	_____	_____
16. hard	_____	_____
17. together	_____	_____
18. using	_____	_____
19. get	_____	_____
20. money	_____	_____
21. letters	_____	_____
22. predict	_____	_____
23. justify	_____	_____
24. different	_____	_____
25. approach	_____	_____

Total correct_____x 4 = _______% correct

CRITERION TEST - FORM B

Part 1:

may came heavy next most scatter ideal you who musical leaped now began ways become hard together using get money letters predict justify different approach

Part 2:

(This part of the test is timed and you should record the time required to read the 10 sentences, then calculate total time when you have finished. Since you will be asking a question after each sentence it will be necessary for you to stop the stopwatch at the end of each sentence after the trainee has finished reading it, and start it again when he or she begins the next sentence. The questions to be asked by the instructor at the end of each sentence are listed beneath the sentences along with blanks for recording whether the responses were correct or incorrect.)

SAY: This section of the test consists of some sentences which I want you to read to yourself. After you have read each sentence I will ask you a simple question about what the sentence said. This section of the test is timed so you should read as rapidly and accurately as you can. Position the Stereotoner on the number in front of the first sentence. Do not begin reading the sentence until I say "begin." You should stop when you have finished the sentence so that I can ask the question. Do not go to the next sentence until I tell you. Do you have any questions?

(After each sentence record the time for that sentence. Then ask the question that goes with the sentence. Record the correctness of the trainee's response and then say:)

SAY: Now move the Stereotoner to the next line and position it over the number of the sentence. Do not begin the sentence until I say "begin."

(At the completion of Part 2, calculate the total time spent reading the sentences in minutes and seconds.)

Criterion Test - Form B

Part 2 (continued)

1. The hungry tramp ate the ham sandwich quickly.
2. The employees of the company didn't like the new working hours.
3. The old man was tired from his walk down the street.
4. My mother was furious with the howling cat.
5. I am very happy that my sister will be able to visit us next June.
6. The angry man was ashamed after speaking harshly to his daughter.
7. The policeman ran through the yard after the criminal.
8. In the old West, many outlaws carved notches on their rifles.
9. The plane landed 20 minutes early.
10. The calendar had the date "July 31" circled in red.

Criterion Test - Form B
Administration Instructions Continued - Part 2

1. The hungry tramp ate the ham sandwich quickly ______Time
QUESTION: Who ate the sandwich?
ANSWER: the hungry tramp or tramp _____Correct_____Incorrect

2. The employees of the company didn't like the new working hours. ______Time
QUESTION: What didn't the employees like?
ANSWER: the new working hours _____Correct_____Incorrect

3. The old man was tired from his walk down the street. ______Time
QUESTION: Where had the old man walked?
ANSWER: down the street, street _____Correct_____Incorrect

4. My mother was furious with the howling cat. ______Time
QUESTION: Who was furious with the cat?
ANSWER: my mother, mother _____Correct_____Incorrect

5. I am very happy that my sister will be able to visit us next June.______Time
QUESTION: Who will be visiting?
ANSWER: sister _____Correct_____Incorrect

6. The angry man was ashamed after speaking harshly to his daughter. ______Time
QUESTION: Who did the man speak harshly to?
ANSWER: his daughter _____Correct_____Incorrect

7. The policeman ran through the yard after the criminal. ______Time
QUESTION: What was the policeman running through?
ANSWER: yard _____Correct_____Incorrect

8. In the old West, many outlaws carved notches on their rifles. ______Time
QUESTION: Who carved notches on the rifles?
ANSWER: outlaws, old West outlaws _____Correct_____Incorrect

9. The plane landed 20 minutes early ______Time
QUESTION: How early was the airplane?
ANSWER: 20 minutes _____Correct_____Incorrect

10. The calendar had the date "July 31" circled in red. ______Time
QUESTION: What date was circled in red?
ANSWER: July 31, date on dalendar _____Correct_____Incorrect

Part 3: (This part of the test is not timed.)

Say: Here are some different reading selections. I will tell you what to do for each selection. There are thick lines between each selection so you can tell when you are at the end of a selection. This part of the test is not timed.

1. Here is a sentence in a different kind of type style. Now read the sentence aloud to me. (If the pupil reads any word wrong, draw a line through that word.)

My dog is big and barks a lot. Once he jumped on an old lady. Now he goes to school to learn how to behave.

0 wrong _____
1-2 wrong _____
3 or more wrong _____

2. Here is a sentence in a different kind of type style. Now read the sentence aloud to me. (If the pupil reads any word wrong, draw a line through that word.)

Jane asked me if I would loan her a dollar. I said yes, but I never got it back. Jane is no longer my friend.

0 wrong _____
1-2 wrong _____
3 or more wrong _____

3. Here are some names and phone numbers. Find Mr. Paul Harmon's phone number--read it aloud to me.

Hansen Vance 1060 Day rd	842-7088
Hanson Earl 8695 Morey av	842-6553
Hardcastle Ira 8282 Murray av	842-4944
Harker Robert D 240 2nd	842-5274
Harmon Paul 8080 Swanston Ln	842-3539
Harms Dwayne 8313 Kelton dr	842-7850
Haro Antonia 7361 Forest	842-5807

0 wrong _____
1-2 wrong _____
3 or more wrong _____

Part 3 (continued)

4. Here are four labels from bottles or tubes in a medicine cabinet. There is a thin line between each label. Tell me which of these things is dangerous.

WARNING: Keep this and all medicines out of children's reach. In case of accidental overdose, contact a physician immediately.

First Aid
& Burn Cream

CAUTION: As with all medicines keep out of reach of children.

DANGER ☠ POISON
KEEP OUT OF REACH OF CHILDREN
NOT TO BE
TAKEN BY MOUTH

0 wrong ____
1-2 wrong ____
3 or more wrong ____

1. ______

My dog is big and barks a lot. Once he jumped on an old lady. Now he goes to school to learn how to behave.

2. ______

Jane asked me if I would loan her a dollar. I said yes, but I never got it back. Jane is no longer my friend.

3. ______

Hansen Vance 1060 Day rd	842-7088
Hanson Earl 8695 Morey av	842-6553
Hardcastle Ira 8282 Murray av	842-4944
Harker Robert D 240 2rd	842-5274
Harmon Paul 8080 Swanston Ln	842-3539
Harms Dwayne 8313 Kelton dr	842-7850
Haro Antonia 7361 Forest	842-5807

4. ______

WARNING: Keep this and all medicines out of children's reach. In case of accidental overdose, contact a physician immediately.

First Aid & Burn Cream

CAUTION: As with all medicines keep out of reach of children.

DANGER POISON
KEEP OUT OF REACH OF CHILDREN
NOT TO BE
TAKEN BY MOUTH

APPENDIX C

Rules for Coding and Scaling of Analysis Variables

The following variables have been discussed in the body of this report. The rules for their coding and scaling are reported below. Frequency distributions of these variables are displayed in Appendix D.

Sex:	1 = Male 2 = Female
Age:	As is
Number of Years Blinded:	As is
Age When Blinded:	1 = Adulthood; 2 = Adolescence; 3 = Birth, Early Childhood
Marital Status:	1 = Not Married; 2 = Married
Sighted Person in Home:	1 = No 2 = Yes
Education Level:	1 = Grade School; 2 = High School; 3 = Some College; 4 = College Graduate
Previous Auditory Experiences:	Range is 0 to 2; Made up of musical background plus knowledge of Morse Code.
Written Communication Skills:	Range is 0 to 3; Made up of braille skill plus use of optical aids plus previous training with electronic print translation devices.
Employment:	1 = Unemployed; 2 = Employed but not so that Stereotoner would help 3 = Employed and Stereotoner would help
Intelligence:	WAIS, (verbal only)
Auditory Selection Test:	Total right out of 40 items
Audiogram Scores:	Significant heavy loss or correctable loss based on db losses of 35 or greater on Stereotoner tones.
Reading Preference Inventory:	Out of 10 selected items, the number of items on which each trainee indicated a strong preference to be independent in performing the task.

(continued)

APPENDIX C (continued)

Trainee Status:	1 = Veteran 2 = Non-Veteran
Number of Days in Formal Training:	Actual days, weekends excluded, at training center
Average No. of Units per Day Studied in Formal Training:	Refers to number of units studied in formal training divided by days of training.
Absence of Problems during Training:	Range is 0 to 3; Refers to whether or not the instructor felt the trainee did not have a specific physical, emotional or learning problem.
Time to Track a Line:	How many *seconds* it took the trainee *to track* over a page-width line; Made up of a composite of three trials.
WPM on Criterion Test Sentences:	Based on the actual number of words read.
WPM on Criterion Test Paragraphs:	Based on the number of words within paragraphs that were read with certified comprehension divided by elapsed time.
Accuracy on Criterion Test Numbers (% Right):	The number of items correct divided by the number of items attempted, times 100.
Accuracy on Criterion Test Words (% Right):	The number of items correct divided by the number of items attempted, times 100.
Number Right on Criterion Test B Variety Section:	How many of the 7 items in the section on difficult or unusual print materials the trainee was able to answer perfectly or nearly perfectly.
Hours of Use before Criterion Tests:	Total time reported irrespective of subject matter.
Average Hours per Week of Home Study:	Total hours of home study divided by number of weeks.

APPENDIX D

Marginal Distributions of Analysis Variables

Sex:		Male		Female
	N	19	N	11
	%	63.3		36.7

Age:		Under 21	21-25	26-30	31-35	36-40	41-45	46-50	51-55	Over 55
	N	2	10	4	3	0	1	3	5	2
	%	6.7	33.3	13.3	10.0	0.0	3.3	10.0	16.7	6.7

Number of Years Blind:		1-10	11-20	21-25	26-30	31-40
	N	5	4	10	7	4
	%	16.7	13.3	33.3	23.3	13.3

Age When Blinded:		Adult	Adolescent	Child
	N	14	4	12
	%	46.7	13.3	40.0

Marital Status:		Unmarried	Married
	N	17	13
	%	56.7	43.3

Sighted Person in Home:		No	Yes
	N	9	21
	%	30.0	70.0

Education Level:		High School	Some College	Finished College
	N	5	5	20
	%	16.7	16.7	66.7

(continued)

APPENDIX D (continued)

Previous Auditory Experiences:		Low	Moderate	High
	N	4	15	11
	%	13.3	50.0	36.7

Written Communication Skills:		No Skill	One Skill	Two Skills	Three Skills
	N	0	3	22	5
	%	0	10.0	73.3	16.7

Employment:		Unemployed	Employed, Stereotoner Not Helpful	Employed, Stereotoner Helpful
	N	6	11	13
	%	20.0	36.7	43.3

Intelligence:		110-120	121-130	131-140	141-150	Not Tested
	N	2	10	7	8	3
	%	7.4	37.0	25.9	29.6	

Auditory Selection Test (AST Total Score):		25-31	32-34	35-37	38-40
	N	2	9	5	14
	%	6.7	30.0	16.7	46.7

Audiogram Scores:		Significant Hearing Loss	Correctable Hearing Loss
	N	0	30
	%	0	100

Reading Preference Inventory:		0-1	2	3	4	5-10	Not Tested
(Number of important independent reading areas)	N	0	3	20	5	0	2
	%	0	10.7	71.5	17.8	0	

APPENDIX D (continued)

Trainee Status:	Veteran	Non-Veteran
N	10	20
%	33.3	66.7

Number of Days in Formal Training:	8-10	11-15	16-20	21-26
N	8	16	5	1
%	26.7	53.3	16.7	3.3

Average No. of Units per Day Studied in Formal Training:	.31-.60	.61-.90	.91-1.20	1.21-1.50	1.51+
N	6	12	6	5	1
%	20.0	40.0	20.0	16.7	3.3

Absence of Problems during Training:	Three Problem Areas	Two Problem Areas	One Problem Area	No Problem Areas
N	0	4	14	12
%	0	13.3	46.7	40.0

Time to Track a Line (Tracking Score in Seconds):	Under 11	11-20	21-30	31-40	Over 40
N	1	10	11	2	1
%	4.0	40.0	44.0	8.0	4.0

WPM on Criterion Test A Sentences:	0-1.9	2-3.9	4-5.9	6-7.9	8-9.9	10-11.9	12-13.9
N	10	9	5	3	1	1	1
%	33.3	30.0	16.7	10.0	3.3	3.3	3.3

WPM on Criterion Test A Paragraphs:	0-1.9	2-3.9	4-5.9	6-7.9	8-9.9
N	10	14	3	2	1
%	33.3	46.7	10.0	6.7	3.3

APPENDIX D (continued)

Accuracy on Criterion Test A Numbers (% Right):	0 - 20	21 - 40	41 - 60	61 - 80	81 - 90	91 - 100
N	1	3	5	6	4	11
%	3.3	10.0	16.7	20.0	13.3	36.7

Accuracy on Criterion Test A Words (% Right):	0 - 20	21 - 40	41 - 60	61 - 80	81 - 90	91 - 100
N	3	1	2	1	4	19
%	10.0	3.3	6.7	3.3	13.3	63.3

WPM on Criterion Test B Sentences:	0-1.9	2-3.9	4-5.9	6-7.9	8-9.9	10-11.9	12-13.9	14+
N	10	1	3	2	3	1	1	4
%	40.0	4.0	12.0	8.0	12.0	4.0	4.0	16.0

WPM on Criterion Test B Paragraphs:	0-1.9	2-3.9	4-5.9	6-7.9	8-9.9	10-11.9	12-13.9	14+
N	12	1	2	3	0	3	2	2
%	48.0	4.0	8.0	12.0	0.0	12.0	8.0	8.0

Accuracy on Criterion Test B Numbers (% Right):	0 - 20	21 - 40	41 - 60	61 - 80	81 - 90	91 - 100
N	8	1	2	5	4	5
%	32.0	4.0	8.0	20.0	16.0	20.0

Accuracy on Criterion Test B Words (% Right):	0 - 20	21 - 40	41 - 60	61 - 80	81 - 90	91 - 100
N	6	0	2	2	3	12
%	24.0	0.0	8.0	8.0	12.0	48.0

No. Right on Criterion Test B Variety Section:	0	1	2	3	4	5 or more
N	13	3	4	3	2	0
%	52.0	12.0	16.0	12.0	8.0	0

APPENDIX D (continued)

Hours of Use before Criterion Test A:	31 - 50	51 - 70	71 - 90	91 - 110	111 - 130
N	15	12	1	1	1
%	50.0	40.0	3.3	3.3	3.3

Hours of Use before Criterion Test B:	Under 75	76 - 150	151 - 225	226 - 300	Over 300
N	6	9	7	2	1
%	24.0	36.0	28.0	8.0	4.0

Average Hours per Week of Home Study:	0-3.0	3.1-6.0	6.1-9.0	9.1-12.0
N	9	10	5	1
%	36.0	40.0	20.0	4.0

APPENDIX E

Additional Cases within Main Study

Perry S.

Overview: Perry S., a 17 year old high school senior, has been blind since birth from retinoblastoma. His grade two braille reading speed is estimated to be far above average. During the study Perry lived with his parents and traveled outside his home daily using a cane. He plays a musical instrument and knows Morse code.

This candidate combined ability and motivation with excellent study skills, and progressed rapidly in formal training and independent study. His reading rate at the end of formal training was considerably above average and he soon began to depend on the Stereotoner for daily reading tasks. A year after formal training he was enthusiastic and expressed confidence in his increased ability to benefit from continued practice and use.

Pretraining tests: Perry's score on the verbal portion of the WAIS was slightly above the 95th percentile. An audiometric test indicated no hearing loss. His score on the Auditory Selection Test indicated excellent prospects for successful completion of the training course. Tracking test scores were somewhat above average. On the Reading Preference Inventory, Perry indicated that it is important to him to be able to read materials that would enable him to be more independent in daily living (e.g., bank statements, bus schedules). At that time, most of these materials were either not read or were being read to him by someone else.

Progress during formal training: Perry completed formal training in two weeks, averaging almost 1-1/2 units per day. At that time he had progressed through the unit on equipment operation and utilization and was reading sentences at 12 WPM and paragraphs at slightly better than 7 WPM. He picked out distinguishing features of the letters well, and he was able to track proficiently. During his second week of training, he was developing confidence and was adjusting for various type sizes with ease.

Follow-up to formal training: In a telephone interview one month after training, Perry showed enthusiasm and confidence in his reading progress. He was reading a technical manual and had begun home study. He worked steadily in the Home Study Manual, averaging about four hours a week. He completed all four units in four months.

One year after completion of formal training, Perry's reading speed had increased to 22 WPM for sentences and 20 WPM for paragraphs. He indicated satisfaction with all aspects of his training and a growing dependence on the Stereotoner in his daily life.

Greg F.

Overview: Greg F., a 55 year old non-veteran, has been visually impaired since birth as a result of glaucoma. By the age of 21 he was totally blind. Greg is a college graduate and works as a rehabilitation teacher. He is married and sighted assistance is available in the home. Greg has an extensive musical background and worked as a piano technician at one time. He knows Morse code as well as grade three braille. His braille reading speed is estimated to be above average. Greg was independently using a cane.

Greg had no outstanding problems in formal training, but his cautious approach to reading tended to slow him down. He made slow, steady progress, but his reading rate at completion of training was below average. His study skills were excellent, and he continued to practice daily. The result was a marked increase in reading speed and proficiency.

Pretraining tests: Greg's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test revealed no hearing loss in any range. His score on the Auditory Selection Test indicated excellent prospects for successful Stereotoner training. Tracking test scores were somewhat above average. On the Reading Preference Inventory, Greg indicated that he would like to be able to read short typed material such as memos and magazine articles. He also said he would like to be able to check his mail and typing.

Progress during formal training: Greg spent ten days in formal training. He progressed into the unit on equipment operation and utilization, working an average of three hours on each unit. Greg made slow but steady progress during formal training, concentrating on developing proficiency in letter recognition, tracking, and control adjustment. At the completion of formal training he was reading slowly but accurately. His reading rate at this time was 2.9 WPM for sentences and 3.1 WPM for paragraphs.

Follow-up to formal training: In a telephone interview six weeks after formal training, Greg expressed general satisfaction with his training experience. He said he had felt rushed, but was ready to work on his own at the completion of formal training. At the time of the telephone interview he said he had reviewed the entire basic Instructional Manual on his own and had begun the Home Study Manual.

Greg continued with daily practice, averaging one hour per day for five months following formal training. He worked steadily in home study unit A, began scanning his mail and various catalogs, magazines and price lists, and started reading a hard-cover book. He said he "puttered around" a lot with the Stereotoner, experimenting with different reading materials and devising new study techniques. He was pleased with his developing ability, and was beginning to concentrate on reading for speed. At the end of his home visit, Greg had become very proficient with letter recognition, tracking, and control adjustment. His cautious, meticulous style tended to slow him down somewhat. Greg's reading rate at this time was 8.3 WPM for sentences and 5 WPM for paragraphs.

This trainee's commitment to regular practice enabled him to develop modest initial skill into a very functional reading ability. He said the Stereotoner was a useful tool in his work and in his private life.

Betty B.

Overview: Betty, a 23 year old rehabilitation teacher, has been blind since birth. The cause of her blindness was not indicated. She lives in an apartment with her sister. There is no sighted assistance in the home. Betty sings and plays several musical instruments. She is a proficient cane traveler. Her grade two braille speed is estimated to be well above average.

This trainee progressed at a steady pace and her reading rate was well above average at the end of formal training. She completed the Home Study Manual in ten months and used the Stereotoner daily at home and at work. Eight months after formal training her reading rate had approximately doubled.

Pretraining tests: Betty's score on the verbal portion of the WAIS was slightly above the 97th percentile. An audiometric test showed no hearing loss in either ear. Her score on the AST indicated excellent potential for successful Stereotoner training. Tracking test scores were slow but highly accurate. On the Reading Preference Inventory, Betty indicated a strong desire for more reading independence.

Progress during formal training: Betty spent 14 days in formal training and completed the unit on equipment operation and utilization in her basic Instructional Manual. She was highly motivated and cooperative and did not become easily frustrated. She heard the code well and had no problem tracking. Although rather cautious on control adjustment, she was an excellent context reader, and was willing to guess when unsure of a letter or word. Her reading rate at the end of formal training was 7.5 WPM for sentences and 5.6 WPM for paragraphs.

Follow-up to formal training: In a telephone interview one month after formal training Betty said she had enjoyed her training experience and felt ready to begin independent study. She was enthusiastic but realistic regarding her current progress. Betty worked steadily in the Home Study Manual and completed Units A, B, and C before her home visit. She subsequently completed all four units in 10 months.

In a home interview eight months after formal training, Betty reported that she used the Stereotoner for a variety of tasks including such unusual things as clothing identification. Her practice had included reading cooking labels, a candy box label and a lengthy narrative on a favorite record album. She used the Stereotoner daily on her job. At this time her reading rate had increased to 11 WPM for sentences and 10.3 WPM for paragraphs. She was developing confidence as well as dependence on the Stereotoner and expected that her reading speed would continue to increase.

Phil R.

Overview: Phil R., a 53 year old veteran, has been blind since he was 23 as a result of trauma in combat. He has travel vision but is unable to read print visually. A college graduate, he directs a local social service agency. Phil is married and there is sighted assistance in the home. He travels outside his home daily using a cane. He has no background in music and no prior experience with auditory tones or code. He reads grade two braille at a rate considerably below average.

Although this trainee was a steady, cooperative student, he made very limited progress in formal training and had little success maintaining a schedule of independent study. His pretraining test results were not encouraging, and he experienced a high frequency hearing loss which impeded reading progress. One year after formal training he was unable to demonstrate functional reading ability.

Pretraining tests: Since Phil had administered the WAIS to others, no valid score could be obtained for him on this measure. An audiometric test revealed moderate to severe hearing loss in the 2000 to 4000 HZ range. Phil's score on the Auditory Selection Test indicated poor prospects for successful Stereotoner training. No tracking test scores were obtained. On the Reading Preference Inventory, Phil indicated that most reading tasks were of moderate importance or less, and that most of these were currently being done for him by someone else. He said that he would prefer to read payroll statements, short magazine articles, and return address on envelopes for himself if he could.

Progress during formal training: Phil spent fifteen days in formal training and completed only the basic alphabet units. His average study time with his instructor on each unit was six hours. Phil was a cooperative student who was able to work steadily for a sustained period of time. He progressed very slowly, practicing evenings and weekends with limited results. At the end of three weeks of formal training, Phil's reading skills were considerably below average. His instructor decided against administering Criterion Test A at this time. He decided to take the Stereotoner home with him, hoping to develop skill in independent study.

Follow-up to formal training: In a telephone interview one month after formal training, Phil indicated that he was continuing to study in the basic Instructional Manual, using a braille copy of the material to check his work. He did not feel confident working on his own. Phil continued to work with the Stereotoner, but did not maintain a regular study schedule and did not begin the Home Study Mnaual. His average study time in the year following formal training was five hours per month. Eleven months after completion of formal training, Phil was unable to identify print characters using the Stereotoner. He complained of a constant ringing in his ears and an inability to distinguish tones in the higher frequencies.

This trainee was a steady, cooperative worker. His marked hearing loss made tone pattern identification difficult. His motivation to continue with regular practice was somewhat affected by the availability of sighted assistance at home and at work. At the completion of the study, he said he would probably return the Stereotoner if he was unable to show satisfactory progress within the next three months.

Brian R.

Overview: Brian R., who was 23 at the time of the study, has been blind since birth from retrolental fibroplasia. Brian is a high school graduate who works as a medical transcriptionist. He lives with his parents and travels outside his home daily using a cane. Brian's grade two braille reading speed is estimated to be average. He played a musical instrument in high school and sang in the school choir.

Although Brian had no difficulty with letter recognition, he made limited progress in formal training. Due to problems with tracking and alignment his reading rate at the completion of training was below average. He used the Stereotoner daily on his job, but did not begin the Home Study Manual. When tested three months after formal training, his word recognition had improved but he was still having difficulty with tracking, and his understanding of lamp and magnification control was poor.

Pretraining tests: Brian's score on the verbal portion of the WAIS was at the 98th percentile. An audiometric test revealed no hearing loss in any range. His score on the Auditory Selection Test indicated excellent potential for successful Stereotoner training. Tracking test scores were somewhat below average. On the Reading Preference Inventory, Brian indicated that it was important to him to be able to check his own typing at work and to read short, typed memos and articles and bills and package labels.

Progress during formal training: Brian spent 14 days in formal training and progressed into the unit on equipment operation and utilization. He spent an average of five hours on each unit, devoting approximately twice that much time to the unit on building reading speed. Brian oriented easily to the Stereotoner and related tone patterns to letter shapes well. He experienced difficulties with tracking and line change, and did not develop an adequate understanding of lamp and magnification adjustment. His reading rate at the completion of formal training was 1.6 WPM for sentences and 2.5 WPM for paragraphs.

Follow-up to formal training: In a telephone interview one month after formal training, Brian expressed general satisfaction with his training experience. Although the schedule was very concentrated, he had felt confident that he would be able to work on his own after leaving the training situation. He was pleased that he was able to use the Stereotoner in his work and expressed a growing dependence on it in this area. Brian was interviewed in his home three months after formal training. At this time he reported that he used the Stereotoner daily to check his typing at work. He had not made a serious effort to begin the Home Study Manual and his practice time on other materials averaged one hour per week. His reading rate for sentences had increased to 4 WPM, but his speed on paragraphs had decreased to 1.7 WPM. Brian's tracking was poor and he had to be reminded to adjust brightness and magnification in order to obtain a clear tone pattern. After receiving assistance with initial control adjustment, his letter recognition was good. Inadequacies in skill were largely due to the brief time period between formal training and the home visit, and to the fact that Brian's practice and use had consisted almost entirely of checking forms in his typewriter at work, an exercise which would improve letter recognition but give no practice in tracking or line change.

Brian realized that he would have to expand his practice to include a wider variety of materials in order to improve his general reading ability. He said the Stereotoner had proved to be more helpful at work then he had thought it would be. He planned to continue with regular practice and use and was optimistic about its increasing functionality in his life.

Gail P.

Overview: Gail P., who was 28 at the time of the study, has been blind since birth. The cause of her blindness was not indicated. Gail has completed two years of college and holds a responsible position in a private organization dealing with rehabilitation of the handicapped. Gail lives alone and travels outside her home daily using a cane or a dog guide when appropriate. Her grade two braille reading speed is estimated to be average. She has no background in music and has had no previous experience with auditory tone patterns. However, she is a teacher of the Optacon, an optical-to-tactile ink print reading device.

Gail hoped to supplement her teaching skills by learning to use the Stereotoner. She progressed easily in formal training, and her reading rate was average. She did not continue with regular practice and use, however, and seven months after formal training her reading rate remained the same.

Pretraining tests: Gail's score on the verbal portion of the WAIS was at the 98th percentile. An audiometric test revealed no hearing loss in any range. Her score on the Auditory Selection Test indicated excellent potential for successful Stereotoner training. Scores on the tracking test were average. Since Gail was a proficient Optacon reader, her responses on the Reading Preference Inventory did not indicate significant need for increased reading independence.

Progress during formal training: Gail spent eight days in formal training and completed the unit on equipment operation and utilization. She progressed very rapidly, averaging 2½ hours per unit. Gail experienced no difficulty with any aspect of training. She was quickly able to identify letter patterns, track correctly, and adjust for brightness and magnification. Due to her Optacon experience, Gail was familiar with print letter styles and formats, and this enabled her to progress more rapidly. Gail's reading rate at the completion of formal training was 4.3 WPM for sentences and 3.8 WPM for paragraphs.

Follow-up to formal training: In a telephone interview two months after formal training, Gail expressed general satisfaction with her training experience. She had briefly reviewed the "Most Common Words" in the basic Instructional Manual, but had not begun the Home Study Manual. In her capacity as a rehabilitation teacher she had demonstrated the Stereotoner several times. Gail did not continue with regular practice and use, and when tested seven months after formal training her reading rate had decreased very slightly to 4.2 WPM for sentences and 3.2 WPM for paragraphs.

This trainee was bright and highly motivated in general, and rapidly acquired the skills necessary to read with the Stereotoner. Being a proficient Optacon user, and thus able to read ink print, she lacked the specific motivation to become highly skilled with the Stereotoner. She was pleased with the device and planned to develop her ability to use it, hoping, in the future, to instruct others in its use.

Matt A.

Overview: Matt A., a 51 year old veteran, has been blind since he was 21 as a result of trauma in combat. Matt is a college graduate and is employed as a counselor. He is married and sighted assistance is available in the home. Matt travels outside his home daily using a cane. Although his musical background is not extensive, he plays a musical instrument and is an avid hi-fi fan. Matt reads grade one braille and has had experience with Morse code.

This trainee showed good initial ability in formal training, but he had difficulty following instructions. He preferred to read letter-by-letter with high accuracy, and, as a consequence, his reading rate was considerably below average at the end of formal training. He did not appear to benefit from independent study, and when tested seven months after formal training he was unable to demonstrate functional reading ability.

Pretraining tests: Based on clinical observation by a psychologist, this candidate's verbal ability was judged to be in the bright-normal range. An audiometric test revealed no hearing loss in any range. His score on the Auditory Selection Test indicated fair prospects for successful Stereotoner training. Tracking test scores were average. On the Reading Preference Inventory, Matt indicated that he would prefer greater reading independence in areas related to his work (e.g., reading typed memos, proofing his typing, using reference books). All of his reading was currently being done for him by someone else.

Progress during formal training: Matt remained in formal training for seventeen days and progressed into the unit on equipment operation and utilization. He spent an average of six hours on each unit. Matt tracked well but had persistent difficulty with initial line-up. He was a careful and accurate reader, but his persistence in reading letter-by-letter made speed building a problem. He never learned how to scan whole words with ease. His reading rate at completion of formal training was 1.0 WPM for both sentences and paragraphs.

Follow-up to formal training: In a telephone interview one month after completion of formal training Matt expressed dissatisfaction with several aspects of his training experience. He had not been comfortable with the living and transportation arrangements which had been provided, and he felt that the training schedule was too concentrated. He said he had been having technical problems with his Stereotoner (particularly with batteries) and had not been able to practice. In a home interview seven months after formal training, Matt said that his Stereotoner had been inoperable for several months following training. Four months prior to the interview he had begun a regular program of independent study, reviewing the basic Instructional Manual. He reported an average study time of approximately one hour per day. However, at the time of the interview Matt was unable to demonstrate a functional reading ability. No timed reading rate could be obtained at this time.

Although this trainee demonstrated good initial ability, his attitude in formal training was counterproductive. He had great difficulty following instructions and insisted on devoting time to minor problems in tracking and alignment, instead of attempting to correct more serious difficulties. He postponed home study due to problems with the equipment. After it was repaired, he reported a considerable amount of study time, yet his demonstrated ability had decreased.

Gary P.

Gary P., 22, has been blind since infancy as a result of retinoblastoma. Gary completed two years of college and is employed as a piano technician. He lives alone and travels outside his home daily using a cane. He has an extensive musical background and sometimes works as a musician. Gary's grade two braille reading speed is estimated to be considerably above average.

This trainee possessed excellent ability and a positive attitude toward training. He made very rapid progress and his reading rate was above average throughout formal training and home study. He was able to use the Stereotoner functionally in his daily life, and while he read very accurately, he was not particularly concerned about developing speed.

Pretraining tests: Gary's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test revealed no hearing loss in any range. His score on the Auditory Selection Test indicated excellent potential for successful Stereotoner training. Tracking test scores were average. On the Reading Preference Inventory, Gary indicated that he would like to be able to read those materials which would enable him to be more independent in daily living (e.g., package labels, personal mail, bills and statements, short typed articles).

Progress during formal training: Gary progressed very rapidly in formal training, spending less than two hours on each unit. He remained in formal training for 10 days and completed the unit on equipment operation and utilization. His mechanical skills are good and he had no trouble understanding the operation of the equipment. Because of his excellent manual skills and his ability to hear the code, Gary was able to track with ease. He quickly mastered material in the later units, and in the second week of training was able to read mimeographed papers and bills which he brought from home. His reading rate at the completion of formal training was 6.1 WPM for sentences and 4.4 WPM for paragraphs.

Follow-up to formal training: In a telephone interview one month after formal training, Gary expressed satisfaction with his training experience. Learning to read with the Stereotoner had not been difficult for him, and his progress had been much as he had expected it would be. He had not found it necessary to review the basic Instructional Manual and had begun work in the Home Study Manual immediately. In an interview in his home four months after completion of his formal training, Gary was realistic and confident regarding his future use of the Stereotoner. He said he used it primarily for reading his mail and catalogs which he used in his work. He spent one-half to one hour per day in practice and use. He was satisfied with his present ability, feeling that rapid reading was not necessary for his purposes. His letter recognition was very good and he handled the equipment with ease. Gary's reading rate at this time had increased to 10 WPM for sentences and 8 WPM for paragraphs.

Due to his exceptional ability and his mature approach to training, Gary quickly developed the skills necessary for functional reading. He did not feel that building reading speed was particularly important for his purposes, and thus did not show the progress that might be expected for one of his ability. He was pleased with the device, saying, "I wanted to be able to read my mail."

Bill T.

Overview: At the time of the study, Bill T. had been blind for nine years from diabetic retinopathy. A 47 year old non-veteran, Bill lives with his wife and four children. Bill is a college graduate and is self-employed as an optical design consultant. He has had rehabilitation training in travel and communication skills, and was also trained to use the Optacon, an optical-to-tactile ink print reading device. At the time of his training, his travel skills were minimal, and he was unable to demonstrate functional reading ability either in braille or with the Optacon.

Bill's primary motivation for learning to use the Stereotoner was to be able to read computer printouts in his work. He developed the ability to decipher tone patterns, but worked very slowly. His reading rate at the end of formal training was considerably below average. To meet his specialized needs, Bill developed a letter code to use when writing computer programs. He was able to read his own print-outs, but did not continue with other forms of independent study.

Pretraining tests: Bill's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test revealed no significant hearing loss. His score on the AST indicated fair prospects for successful Stereotoner training. Tracking test scores were considerably below average. On the Reading Preference Inventory, Bill indicated that he was satisfied to have most reading tasks done for him by someone else.

Progress during formal training: Bill spent 15 days in formal training and finished the unit in the basic Instructional Manual which is concerned with building reading speed. He had particular difficulty with high tones, and became fatigued easily. He experienced consistent tracking problems but overcame this and continued with slow, steady practice throughout the training period. His reading rate at the end of formal training was 1.1 WPM for sentences and 0.5 WPM for paragraphs.

Follow-up to formal training: In a telephone interview two months after formal training, Bill reported general satisfaction with the training situation and expressed some disappointment that he had not made better progress. He said he was continuing to study in the basic Instructional Manual and was working on some special assignments which his instructor had given him. Perhaps due to the fact that Bill's personal reading requirements were limited and specific, i.e., computer print-outs consisting of numbers and capital letters, he was not interested in working in the Home Study Manual which was designed to develop more general reading skills. Because number recognition was particularly difficult, he developed a code of easily recognizable capital letters to use when writing computer programs. When tested one year after formal training, he was able to read his own print-outs which consisted of familiar cue words and his unique letter code. He did not begin the Home Study Manual, and was not able to interpret tone patterns other than those on his print-outs. He reported that he continued to depend on help from sighted members of his family in accomplishing work-related reading tasks.

Hal S.

Overview: Hal S., 21, has been blind since birth from retrolental fibroplasia. Hal estimates his grade two braille speed to be average. He has an extensive musical background and was enrolled in the Visotoner Screening course and successfully completed six lessons. A college graduate, Hal lived with his parents. He was unemployed at the time of his formal training, but subsequently obtained a job in transportation, a career field of his choice.

This candidate progressed rapidly in formal training and appeared to be well motivated. He worked steadily but slowly in the Home Study Manual, however, and a year after completion of his formal training his reading speed had increased slightly. His attitude was positive at that time and he indicated overall satisfaction with the Stereotoner.

Pretraining tests: Hal's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test revealed no important hearing loss. His score on the Auditory Selection Test indicated excellent potential for success with the Stereotoner. His scores on the tracking test were within average range. On the Reading Preference Inventory, Hal indicated that most types of reading were important to him, and that if he could, he would prefer to do most of his reading independently.

Progress during formal training: Hal spent two weeks in formal training and progressed through the unit on equipment operation and utilization. He completed approximately 1-1/2 units per day. At that time his reading speed was 6.6 WPM for sentences and 3.3 WPM for paragraphs. He heard the code very well, tracked with relative ease, and by the beginning of his second week of training was able to adjust for different type sizes.

Follow-up to formal training: In a telephone interview one month after training, Hal indicated that he had begun the Home Study Manual and was also reading typed letters and bulletins from various agencies. He completed home study units A, B, and C in one year, working an average of three hours a week. Subsequent to his home visit and second criterion test, he completed home study unit D satisfactorily.

Eleven months after completion of his formal training, Hal's reading speed was 6.4 WPM for sentences and 4.6 WPM for paragraphs. He said he read with the Stereotoner daily, used it at work, and found it to be a useful tool in daily living.

Owen D.

Overview: At the time of the study, 20 year old Owen D. was a junior in college. He was living on campus and had a part-time job at the college. Owen has been blind since birth from retrolental fibroplasia. His grade two braille reading speed was estimated to be well above average. He had studied piano for several years. Owen described himself as a proficient cane traveler.

This candidate was highly motivated, but made limited progress in formal training and did not continue regular practice with the Stereotoner. Although enthusiastic and confident in many areas of his life, he appeared to lack the self-discipline necessary for independent study. He tended to become anxious and discouraged when a sustained effort was required, and when tested in his home one year after completion of formal training he was unable to demonstrate a functional reading ability.

Pretraining tests: Owen's score on the verbal portion of the WAIS was somewhat above the 97th percentile. An audiometric test showed no important hearing loss in any range. His score on the Auditory Selection Test indicated good prospects for successful Stereotoner training. Tracking test scores were consistent and within average range. On the Reading Preference Inventory, Owen indicated a strong desire for more reading independence, noting that most reading tasks were presently being done for him by someone else.

Progress during formal training: Owen spent 11 days in formal training. He completed the unit on new formats in the basic Instructional Manual. He tracked well, but had difficulty with the code and poor comprehension. The introduction of a new type style caused great difficulty, and the trainee showed considerable anxiety when being tested. At the end of formal training, Owen was reading 2.3 WPM on both sentences and paragraphs.

Follow-up to formal training: In a telephone interview one month after training, Owen indicated general satisfaction with the training he had received. He felt that the schedule had been demanding at times, and that some of the lessons were too long. At the time of the phone call, he said he was trying to use the Stereotoner to read personal mail and typed materials at work. He had not continued to study in the basic Instructional Manual and had not begun the home study course.

In an interview in his home one year after formal training, Owen reported that his independent study time had been limited and sporadic, and he reported no study time at all during the two months prior to his home visit and final criterion test. One year after training Owen demonstrated no functional reading ability.

Paula L.

Overview: Paula L., 23, is congenitally blind from retrolental fibroplasia. Paula, a college graduate, was seeking employment when she began her participation in the project. She subsequently found work as a clerk-typist. She is a proficient cane traveler. At the time of the study she was living with her family. Paula's estimated grade two braille speed is above average. She studied piano for five years. This trainee had a slight orthopedic condition, resulting in a weakness of the right hand, which appeared to affect her coordination.

Paula progressed at an average rate during formal training. Her reading rate increased slightly during home study and she was able to use the Stereotoner for personal reading tasks and work-related activities. Her curiosity and persistence seemed to compensate somewhat for any lack of physical strength and coordination.

Pretraining tests: Paula's score on the verbal portion of the WAIS was slightly above the 75th percentile. The examiner commented that this score might have been somewhat depressed due to anxiety. An audiogram showed no significant hearing loss. On the Auditory Selection Test, Paula showed good prospects for success with the Stereotoner. Her tracking test scores were erratic and somewhat below average. On the Reading Preference Inventory, Paula indicated a strong desire for greater reading independence and noted that most reading tasks were currently either not being done or were being done for her by someone else.

Progress during formal training: Paula progressed through the unit on new formats in 11 days. She heard the code well and could correct her alignment proficiently. Slight mistracking did not seem to affect her reading; and she had no difficulty with new type styles. Although right handed, Paula tracked the probe with her left hand. Weakness in the fingers of her right hand made it difficult for her to control the tracking aid. In spite of her physical problems, this trainee completed formal training in slightly more than two weeks. Her reading speed at this time was 3 WPM for sentences and 4.2 WPM for paragraphs.

Follow-up to formal training: In a telephone interview three months after formal training, Paula indicated that her training experience had been intensive but valuable. She felt that she could have benefited from another week with her instructor. Her confidence had diminished somewhat since leaving the training situation, but she was continuing to study independently. Paula completed home study units A and B in eight months. She estimated her average study time at about 6-1/2 hours per week.

Eight months after formal training, Paula indicated that in addition to working in the Home Study Manual she used the Stereotoner for approximately two hours daily on her job. Her reading speed had increased to 4.4 WPM for sentences and 6.6 WPM for paragraphs. Paula was pleased with her ability to use the Stereotoner on her job and planned to continue with regular practice and use.

Anna M.

Overview: Anna M., a 27 year old clerical worker, has lived alone since the recent death of several close family members. She has been blind since birth from retrolental fibroplasia. Anna is a college graduate. Her estimated grade two braille reading speed is average and she travels independently using a cane.

While patient and persistent, she became easily fatigued and tense during training sessions. Her reading rate at the end of formal training was average, but she did not follow through with home study. Nine months after formal training she elected to return the Stereotoner. She was tested at this time and was unable to demonstrate functional reading ability.

Pretraining tests: Anna's score on the verbal portion of the WAIS was at the 99th percentile. An audiometric test revealed moderate hearing loss in both ears above the 3000 HZ range. However, her score on the Auditory Selection Test showed excellent potential for Stereotoner training. Although tracking test scores were generally in the average range, scores on the last items dropped slightly below average. The Reading Preference Inventory showed a large proportion of reading tasks to be of moderate importance to Anna. She did, however, express a desire for greater reading independence.

Progress during formal training: Anna was a calm and cooperative student who appeared to be limited by lack of physical stamina. Although she heard the code with little difficulty, she had serious alignment and tracking problems which continued throughout her training. She spent 2-1/2 weeks in formal training. At that time she had completed the unit on new formats and her reading speed was approximately 4 WPM for sentences and 2.5 WPM for paragraphs.

Follow-up to formal training: In a telephone interview six weeks after formal training, Anna indicated general satisfaction with her training experience. She was attempting to use the Stereotoner at work, but found it a time consuming task of questionable value. In the three months following completion of formal training, Anna reported an average monthly practice and use time of six hours. This time was spent primarily on the basic Instructional Manual and work-related tasks, but not the Home Study Manual. During the next six months she discontinued regular practice and use.

Nine months after formal training Anna had considerable difficulty with machine adjustment and tracking and her reading speed was less than 0.5 WPM. She said it had been a long time since she had used the device. She thought the Stereotoner was a "good idea," but had not proven to be useful to her.

Lewis E.

Overview: A 47 year old veteran, Lewis E. became blind at the age of 18 as the result of trauma in combat. Lewis is a college graduate and is employed as a rehabilitation teacher for the adult blind. He lives with his wife and children and travels outside his home daily using a cane. His grade two braille speed is average, and he is able to read large print using closed circuit TV or a magnifying telescope.

Although this trainee's pretraining test scores were somewhat below the averages expected for successful candidates, he was a cooperative and highly motivated student who progressed at a satisfactory rate during training. In three weeks he attained a reading rate only slightly below average. Lewis continued to practice independently for a short time, then discontinued regular practice and use. When tested one year after formal training, he was able to recognize letters, however his reading rate was not considered to be functional.

Pretraining tests: Lewis' score on the verbal portion of the WAIS was somewhat above the 97th percentile. An audiometric test showed moderate hearing loss in both ears above the 2000 HZ range. His score on the AST indicated poor prospects for successful Stereotoner training. Tracking tests were somewhat below average. On the Reading Preference Inventory, Lewis reported that most reading tasks listed were important to him, and were currently being done by someone else. He indicated a desire for greater reading independence in most areas.

Progress during formal training: Lewis spent 15 days in formal training and finished the basic instructional unit concerned with equipment operation and utilization. His reading rate at that time was 1.5 WPM for sentences and 1.8 WPM for paragraphs. Initially, Lewis' progress was steady. His tracking and line change were good. However, he required a very high volume setting and began to show signs of tenseness and fatigue as training progressed. Letter confusions became more pronounced in the third week of training, and new typefaces presented great difficulty.

Follow-up to formal training: In a telephone interview one month after formal training, Lewis reported that training had been difficult for him, and that he did not feel prepared to begin independent study. He would have preferred to remain in training for a longer period of time. In an interview in his home one year after formal training, Lewis said that his practice time averaged one hour per day for 3 months after formal training at which time he discontinued regular practice and use. His reading rate at the time of the home interview was 1.1 WPM. He was disappointed with his failure to become proficient with the Stereotoner, but he used the knowledge he had gained in training to demonstrate the device to blind persons considering rehabilitation training. Lewis indicated that his ability to read print with special optical aids had decreased his motivation to learn to use the Stereotoner.

Brenda P.

Overview: Brenda P., 34, has been blind since she was eleven from cataracts. At the time of the study she was completing a doctoral program in psychology and was employed as a counseling psychologist. Brenda lives alone and travels independently using a cane. Her grade two braille reading speed is estimated to be well above average. Her musical background includes piano and violin lessons.

This trainee was a competent and cooperative student and progressed at an average rate in formal training. Although her reading speed at the completion of training was slightly below average, she continued with daily practice and made a significant increase in reading speed in independent study.

Pretraining tests: Since Brenda had administered the WAIS to others, no valid score was obtained for her on this measure. An audiometric test revealed no significant hearing loss. Her score on the Auditory Selection Test indicated excellent potential for successful Stereotoner training. Tracking test scores were somewhat below average. On the Reading Preference Inventory Brenda indicated that she would like to be able to read typed materials on her job, personal correspondence, and labels on canned and packaged goods.

Progress during formal training: Brenda spent 14 days in formal training and completed the unit on equipment operation and utilization. She spent an average of five hours on each unit, devoting more time to the units on additional typefaces and new formats. Brenda was familiar with letter shapes and alternative typestyles and had little difficulty relating tone patterns to letter shapes. She worked at a steady pace. She had some problem keeping proper alignment, but was able to recognize letters when slightly misaligned. Although slower than average, she was an accurate reader. Her reading rate at the completion of formal training was 2.9 WPM for sentences and 2.2 WPM for paragraphs.

Follow-up to formal training: In a telephone interview two months after formal training, Brenda indicated that she would have preferred a less concentrated training schedule. Although somewhat discouraged at her slow reading rate, she had felt confident of her ability to work on her own at the completion of training. Brenda continued with daily practice and use. She worked an average of one hour per day, primarily reading personal mail, magazine articles, reference materials, and checking her typing. She successfully completed home study unit A one year after formal training. In an interview in her home seven months after completion of formal training she reported that training had been difficult for her and that she had been discouraged when she began independent study. At the time of her home visit Brenda was able to operate the Stereotoner with ease, although she appeared to be somewhat tense in the testing situation. Her tracking and control adjustment skills were good. Brenda's reading rate at this time had increased to 7.4 WPM for sentences and 11.3 WPM for paragraphs.

This trainee's steady progress, a result of consistent practice, enabled her to begin to use the Stereotoner for a variety of reading tasks. She was encouraged by this and said that she expected her speed and accuracy to continue to develop.

Glen A.

Overview: Glen A., a 56 year old veteran, became blind at the age of 51 from bilateral retinal detachment. He was unemployed at the time of the study, but he did volunteer work instructing in metal and woodcraft at a nearby Veterans Administration Hospital. A high school graduate, Glen had taken several courses at a local junior college after losing his sight. He lives with his wife and children and travels outside his home daily using a cane. Glen reads grade one braille but his rate was not estimated.

This candidate remained in training for an extended period. He worked slowly and methodically, but was limited in his ability to develop the cognitive and motor skills necessary for functional reading with the Stereotoner. He was unable to work on his own and returned the device five months after completing formal training.

Pretraining tests: Glen's score on the verbal portion of the WAIS was at the 93rd percentile. An audiometric test revealed mild hearing loss in the 3000-4000 HZ range. His score on the Auditory Selection Test was below the level normally considered sufficient to warrant training. Tracking test scores were average on the first ten items, however Glen showed signs of fatigue on the last two items and was unable to complete the test. On the Reading Preference Inventory he indicated that he would like to be able to read short, typed selections and check his own typing. This measure did not show a marked desire for general reading independence, however.

Progress during formal training: Glen spent thirty days in formal training. He completed the unit on equipment operation and utilization, working an average of nine hours per unit. He had great difficulty with letter identification due to his inability to pace smoothly and to distinguish tone patterns. His language skills were modest and he was not aided by context. He labored over each letter, and his scores on unit criterion exercises were consistently below average. At the completion of formal training his reading rate was 0.4 WPM for sentences. Because of his limited reading ability, no rate was obtained for paragraphs. Glen was a slow, patient worker, and his attitude remained positive throughout the training.

Follow-up to formal training: This trainee developed limited skills in formal training and his attempts at independent study were unsuccessful. In a telephone interview two months after formal training he expressed discouragement, saying, "If I had known how difficult it was going to be I might not have done it." When tested in his home five months after formal training he was unable to demonstrate functional reading ability.

Although patient and persistent, this trainee was unable to develop minimal skill even with extended training, and at the time of his home visit he elected to return the Stereotoner. Although pretraining tests were not designed to exclude persons from the study, borderline scores, such as those demonstrated by this candidate on several measures, would warrant careful consideration in the future.

Ken B.

Overview: Ken B., who was 31 at the time of the study, was blinded in an accident during infancy. Ken has a master's degree in music and works in an editorial position with a magazine for the blind. He has slight residual vision but is unable to read print. Ken is married and there is no sighted assistance in the home. His grade two braille reading speed is estimated to be considerably above average. He travels outside his home daily using a cane or dog guide when appropriate.

This trainee had an enthusiastic, yet realistic, approach to training. He had very good abilities and a desire to develop his reading skill. His reading rate was considerably above average at the completion of formal training, and doubled in the following seven months.

Pretraining tests: Ken's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test revealed no hearing loss in any range. His score on the Auditory Selection Test indicated excellent potential for successful Stereotoner training. Scores on the tracking test were average. On the Reading Preference Inventory, Ken indicated that he would like to be more independent in work-related reading activities such as reading typed memos, short articles, and checking his own typing.

Progress during formal training: Ken spent eleven days in formal training and finished the unit on equipment operation and utilization. He progressed through the alphabet units rapidly, spending approximately three hours on each. He spent slightly more time on the last four units covered, and was particularly interested in the unit on encountering new formats. Ken had no difficulty with tracking or letter recognition and he soon began to read contextually. He experienced minor difficulty with control adjustment, but this diminished as training progressed. His study skills were excellent, and he was able to work independently for extended periods. Ken's reading rate at the end of formal training was 8.2 WPM for sentences and 6.4 WPM for paragraphs.

Follow-up to formal training: In a telephone interview one month after formal training, Ken expressed general satisfaction with his training and confidence in his ability to make the Stereotoner a useful part of his life. He had continued to work in the basic Instructional Manual, had begun the Home Study Manual, and was using the Stereotoner at work. His study time averaged three hours per day the first two months after formal training. After that he continued to practice for one hour each day. When interviewed seven months after formal training, Ken was pleased with his developing ability. He was still having some difficulty with lamp and magnification adjustment, but his tracking and word recognition skills were excellent. Ken's reading rate at this time had increased to 16 WPM for sentences and 13.4 WPM for paragraphs.

This trainee's maturity and positive attitude contributed to his steady progress. His ability to work independently and his willingness to experiment with techniques that would increase his reading rate were also contributing factors in his progress.

Mark R.

Overview: Mark R., 32, has been blind since birth from retrolental fibroplasia. He has a B.A. degree and was working as a research associate at the time of the study. Proficient in piano and organ, he writes his own compositions and works part time as a musician. He also knows Morse code. Mark had some familiarity with the Optacon, but had never undertaken a formal training program. He lived alone and traveled outside his home daily using a cane.

This trainee had excellent potential and showed exceptional progress in formal training. His attitude was positive, and he began independent study with no difficulty. As a result of eye surgery six months after formal training, he developed physical problems which interfered with continued use of the Stereotoner. Following this interruption of home study, he did not resume regular practice and use, and one year after formal training he was unable to demonstrate functional reading ability.

Pretraining tests: Mark's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test revealed slight hearing loss in the left ear above the 3000 HZ range. His score on the Auditory Selection Test indicated good potential for successful Stereotoner training. Tracking test scores were above average. On the Reading Preference Inventory Mark indicated that he would like to have more independence in work-related reading activities (e.g., typed memos and correspondence, reference materials, etc.).

Progress during formal training: Mark spent 15 days in formal training and made excellent progress. He completed the unit on equipment operation and utilization. His study time averaged 3-1/2 hours per unit. He had no difficulty identifying the tones, but his lack of familiarity with print letters made it hard for him to relate tone patterns to letter shapes. His tracking and control adjustment skills developed steadily, as did his ability to gain speed from context reading. At the completion of formal training, Mark's reading rate was 9.8 WPM for sentences and 8.8 WPM for paragraphs.

Follow-up to formal training: In a telephone interview two months after formal training, Mark expressed general satisfaction with his training experience. He was still having some difficulty relating tone patterns to letter shapes and suggested that pretraining exposure to print letters, perhaps in raised line form, would have been very helpful. He felt his training had been adequate and he had begun work in the Home Study Manual with no difficulty. He was doing supplementary reading in an electronics book and he was also reading typewritten correspondence daily. Mark's attitude at this time seemed enthusiastic and confident.

Mark continued with regular practice and use for six months following formal training. At that time he had eye surgery which was followed by complications resulting in loss of hearing and dizziness. This condition persisted for several months during which he was unable to use the Stereotoner. He lost his job and began experiencing loss of motivation. He did not resume regular practice and use. When visited in his home one year after formal training, Mark was unable to demonstrate a functional reading ability. At that time, Mark reported that it had been difficult to maintain a consistent pattern of study in view of his rather severe physical and personal problems.

Stan D.

Overview: Stan D., a 55 year old veteran, became blind at age 38 following surgery for a brain tumor. Stan, who holds a master's degree, is a parts buyer for a large manufacturing firm. He reads grade two braille, but his WPM rate is not known. Stan is married and travels outside his home daily using a cane.

This candidate was enthusiastic and cooperative during training and his reading progress was steady but somewhat slower than average. A very busy work schedule and health problems resulting in physical exhaustion made home study difficult. Stan did not continue to use the Stereotoner and a follow-up reading rate was not obtained.

Pretraining tests: Stan's score on the verbal portion of the WAIS was above the 99th percentile. An audiometric test showed moderate hearing loss in both ears above the 1400 HZ level. His score on the AST indicated fair prospects for successful Stereotoner training. Tracking test scores were considerably better than average. On the Reading Preference Inventory, Stan indicated that work-related reading was most important to him and that he would prefer to read this material for himself. It was currently being read for him by someone else.

Progress during formal training: Stan spent 15 days in formal training. He completed the basic instructional unit concerned with equipment operation and utilization and at that time was reading sentences at 2.3 WPM and paragraphs at 2.9 WPM. This trainee was determined to succeed and became very impatient when he felt progress was slow. He tended to track too fast to hear the patterns properly. He was an excellent context reader, but tracking and alignment problems continued throughout formal training.

Follow-up to formal training: In a telephone interview one month after formal training, Stan indicated general satisfaction with his training experience. He felt that more practice with the drill tape on tone patterns would have been helpful. He felt optimistic and confident in his ability as a beginning reader with the Stereotoner. At the time of the phone call, Stan was taking the Stereotoner to work and was practicing 1-1/2 hours each evening.

In an interview in his home one year after training, Stan reported that he had practiced with the Stereotoner for one hour a day for five months following formal training. He felt that his reading rate had remained constant during that time. His work load then became very heavy and he began experiencing health problems which resulted in hospitalization. Due to a combination of work pressure and poor health this trainee discontinued independent study. In view of this, a timed reading test was not administered.

Nina C.

Overview: Nina C., a 21 year old college senior, became totally blind when she was 13 from retrolental fibroplasia. She was living with her family at the time of the study and used a cane for traveling on campus and in her neighborhood. Nina's grade two braille speed is estimated to be average. As a child, she studied piano for two years. She had no other experience with tones or tone patterns.

This trainee was cooperative and hard-working. She progressed at an average rate in formal training and continued to use the Stereotoner daily. She read a variety of materials in independent study and completed two home study units in the year following formal training. Ten months after training her reading speed had increased markedly.

Pretraining tests: Nina's score on the verbal portion of the WAIS was at the 98th percentile. An audiometric test revealed no hearing loss in any range. Her score on the Auditory Selection Test indicated fair prospects for successful Stereotoner training. Tracking test scores were below average. On the Reading Preference Inventory, Nina indicated that she would like to have greater reading independence in all areas. Most reading tasks were currently being done for her by someone else.

Progress during formal training: Nina remained in formal training for 13 days and progressed into the unit concerning equipment operation and utilization. She spent an average of four hours on each unit. Nina's attitude was positive and she made steady progress in training. She related tone patterns to letter shapes well and had no difficulty with character recognition. She was able to achieve proper alignment by scanning a line, but she had little physical strength in her hands and had difficulty controlling the tracking aid. At the completion of her formal training, Nina was reading independently with little help from her instructor. Her reading rate at this time was 4.4 WPM for sentences and 3.4 WPM for paragraphs.

Follow-up to formal training: In a telephone interview one month after formal training, Nina was very enthusiastic about her training experience and her developing reading ability. She had not begun the home study course, but she was using the Stereotoner at home and at school to check her typing and to read personal mail. She had continued to work in the basic Instructional Manual, concentrating on the "Most Common Word" lists. Nina's practice and use time in the ten months following formal training averaged one hour per day. Reading matter consisted of personal mail and typing, school work, a paperback book, and exercises in the Home Study Manual. She completed home study units A and B in the year following formal training.

In an interview in her home ten months after formal training, Nina said that the Stereotoner had become very useful to her. Initially, she had considered it as a challenge, something that would be fun to learn, but had not given much thought to its utility. Nina had some difficulty at this time lining up pages preparatory to reading, but she was able to track with ease. She was unable to adjust for different print sizes. Her reading rate had increased markedly to 15.1 WPM for sentences and 12 WPM for paragraphs.

Nina enjoyed reading with the Stereotoner and was very pleased at the increased independence it offered.

Jane S.

Overview: Jane, 23, has been blind since infancy from retrolental fibroplasia. She is a college graduate who does volunteer tutoring and has some definite career ambitions. She lives with her parents. Jane sings and plays a musical instrument, and knows Morse code. She is a good traveler, and uses a cane for trips outside her home. Her estimated grade two braille reading speed is slightly below average.

Jane progressed rapidly during training, and continued to devote time each day to practice with the Stereotoner after returning home. As a result, her speed had more than doubled at the end of four months. She was highly intelligent and enthusiastic, and perceived the Stereotoner as a tool for increasing her independence.

Pretraining tests: In pretraining tests, Jane's score on the WAIS verbal section was slightly below the 99th percentile. Her scores on the audiometric test indicate that she has good hearing in all ranges. On the Auditory Selection Test, Jane showed excellent prospects for success with the Stereotoner. Tracking test scores ranged from good to poor. On the Reading Preference Inventory, Jane indicated that it is important to her to be able to read those materials that would allow her to be more independent. At that time, most items of this type were being read to her by someone else. She was highly motivated to read for herself nearly all of the time.

Progress during formal training: Jane had three weeks of training and progressed into the unit on new formats. By the end of the second week, she was able to adjust for type size and correct lamp intensity and could read independently. Her reading rate at the end of formal training was approximately 3 WPM for paragraphs and slightly better than 5 WPM for sentences.

Follow-up to formal training: Following training, Jane's home study averaged about one hour per day. Primarily she read her mail and proofread her own typing. She also worked in the Home Study Manual but had difficulty locating specific items.

Four months after formal training, Jane's reading speed had increased to 12 WPM. While she indicated that she had reached a plateau and did not seem to be able to further increase her speed, she was continuing to practice one to two hours a day, and expressed great satisfaction with her experience with the Stereotoner.